AGRICULTURAL *Chemicals*

In this issue

DECEMBER, 1955

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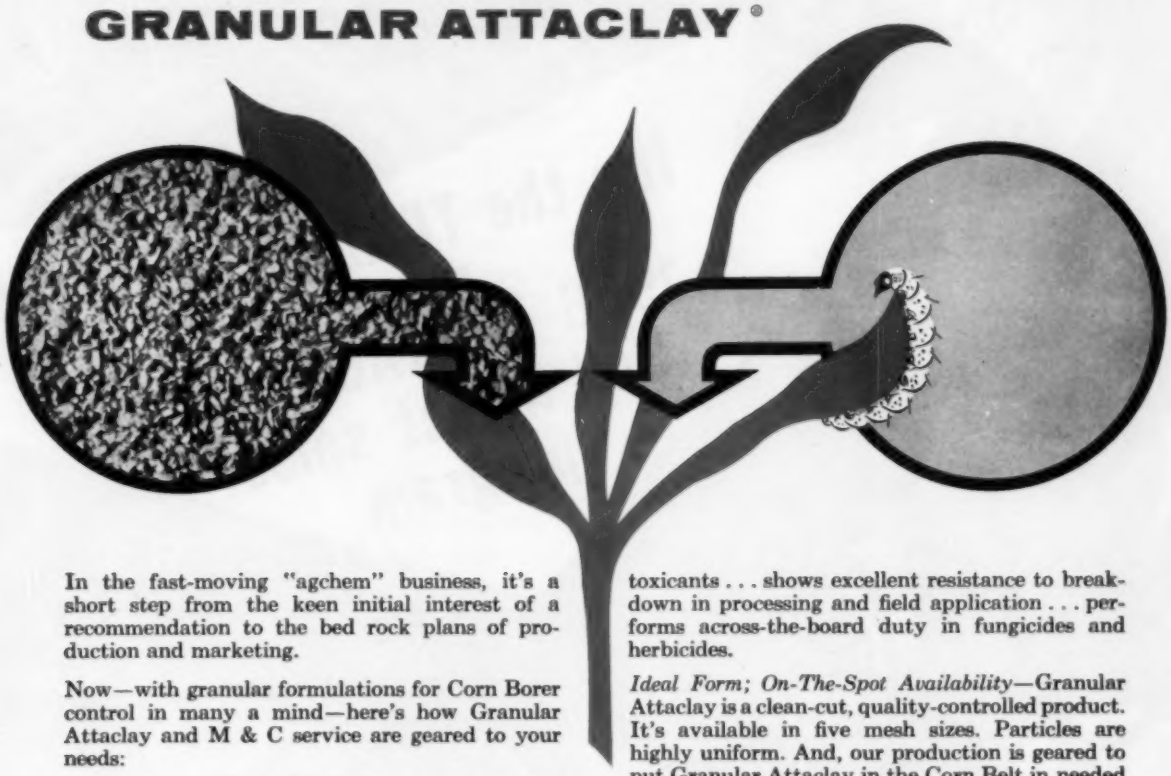
a timely and important message to formulators

For Your **Corn Borer Granular Pesticides** *standardize on the* **original, pioneer carrier–** **GRANULAR ATTACLAY®**



In the fast-moving "agchem" business, it's a short step from the keen initial interest of a recommendation to the bed rock plans of production and marketing.

Now—with granular formulations for Corn Borer control in many a mind—here's how Granular Attaclay and M & C service are geared to your needs:

Good History—Technological development in our own laboratories has produced the excellent properties in today's production of granular carriers for pesticides.

The Route To Superior Products—Granular Attaclay is highly sorptive . . . combines ideally with toxicants . . . shows excellent resistance to breakdown in processing and field application . . . performs across-the-board duty in fungicides and herbicides.

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LET'S WORK TOGETHER
to develop this bright new market. M & C offers a new 8-page bulletin, technical help, product samples. *All* are yours for the asking; use the handy coupon.

"BUY EARLY"—*makes good sense to processor, dealer, grower.*

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MINERALS & CHEMICALS CORPORATION OF AMERICA
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9 Essex Turnpike, Menlo Park, N. J.
Please send me:
☐ New 8-page technical bulletin
☐ Test samples of Granular Attaclay for the following applications:

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name _____ title _____
company _____
address _____
city _____ zone _____ state _____


What is it?
It's the TRADEMARK
of the
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Soil Insect sales
program

AGRICULTURAL Chemicals

Dr. B. A. Porter, newly elected president of the Entomological Society of America, which is holding its annual meeting at Cincinnati, Ohio, November 28-December 1st. Dr. Porter is with the USDA, at Beltsville, Maryland, in charge of the section of fruit insect investigations at the Entomology Research Branch.

Vol. 10, No. 12 December, 1955

AGRICULTURAL Chemicals

ARTICLES

FEATURES

MEMBER AUDIT BUREAU OF CIRCULATIONS

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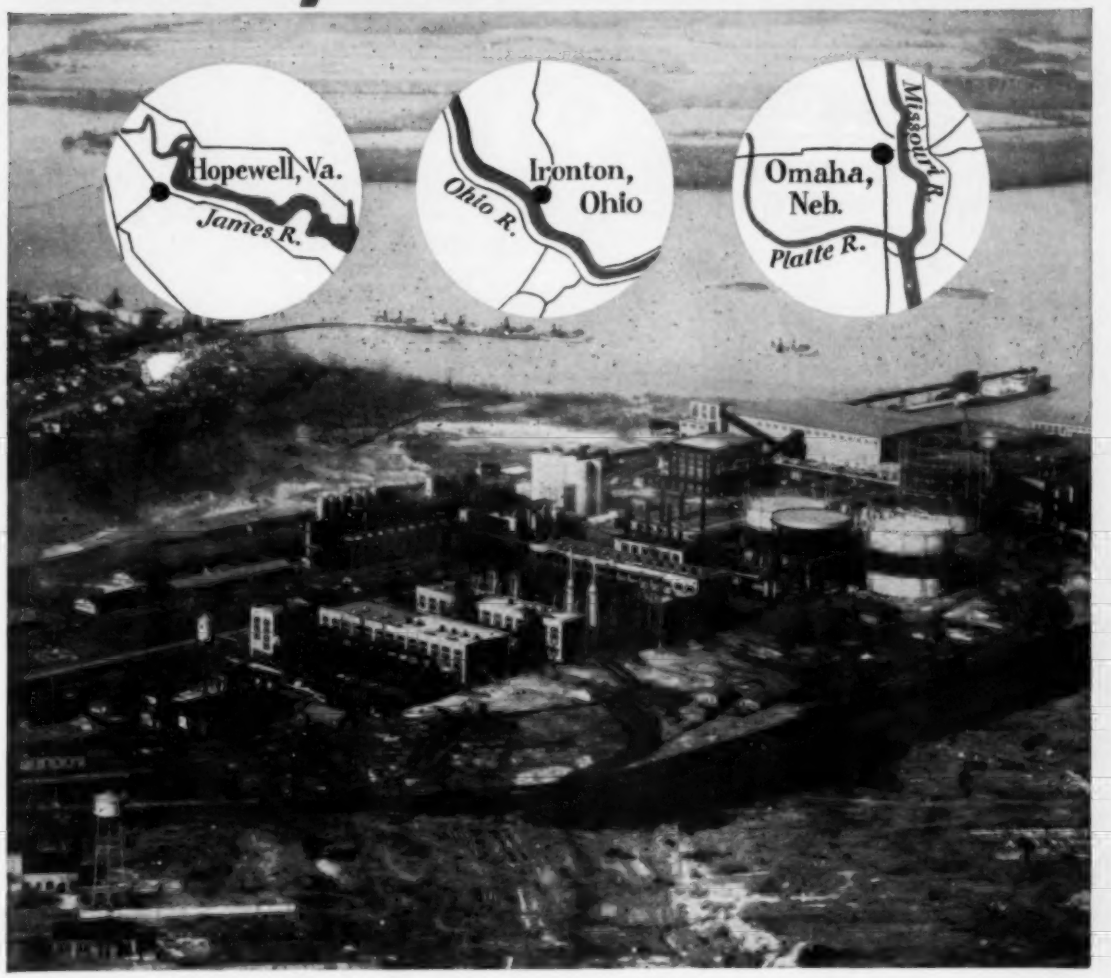
South, North or West...



There's a Nitrogen Division plant ready to serve you . . . handy for shipping by rail or by highway. Three big and growing plants at Hopewell, Virginia, at Ironton, Ohio, and at Omaha, Nebraska, are strategically located to serve the fertilizer industry. We have the quality, the volume and the shipping capacity to supply your needs for Nitrogen Solutions and solids.

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Arcadian

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Nitrogen Solutions (Nitrana® and Urana®)
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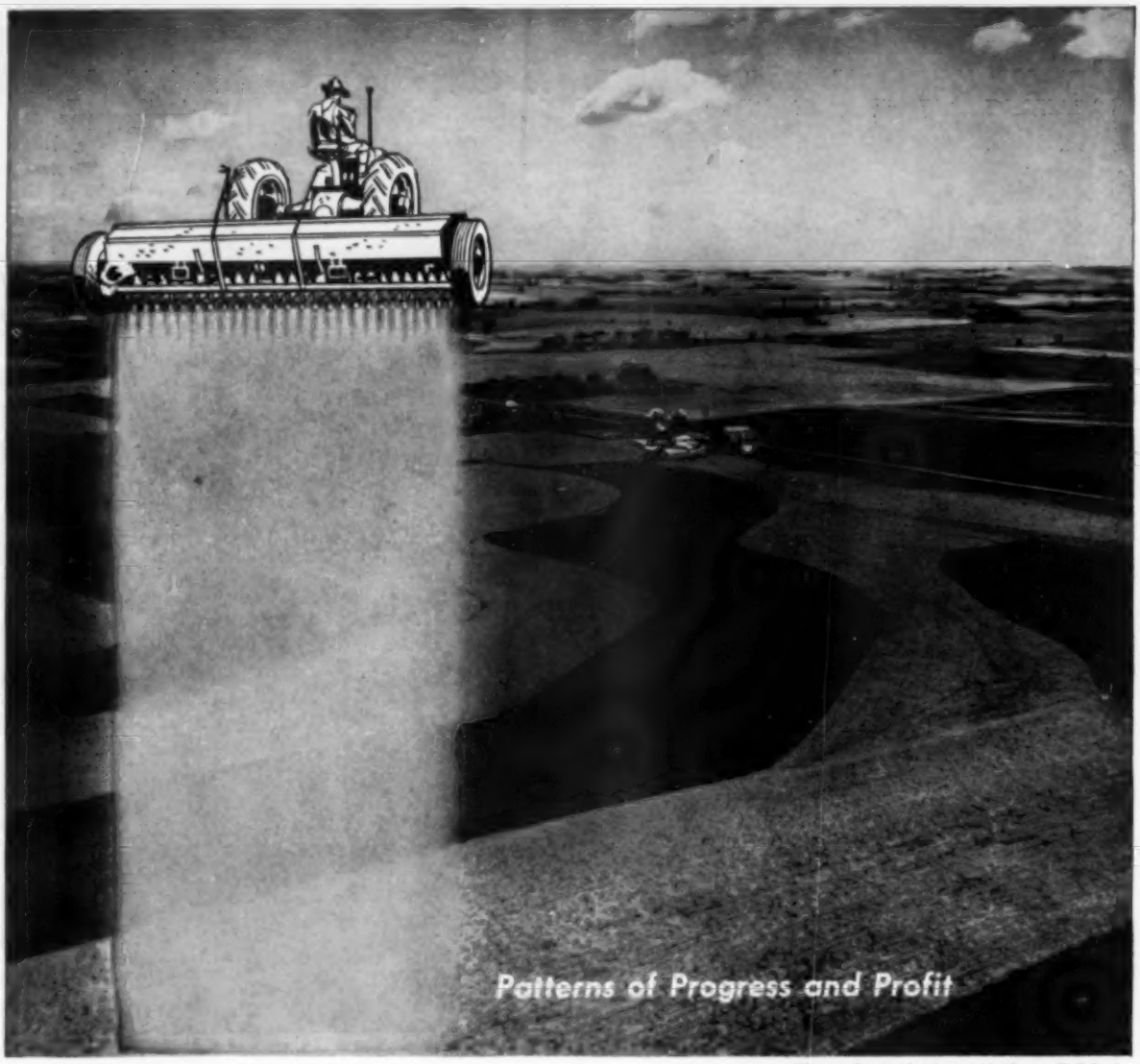

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by DUVAL

Duval Muriate of Potash ranks high as one of the essential nutrients which greatly increase yield and profits in crop production.

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Only POWCO BRAND can give you these positive assurances of consistent top laboratory-controlled *quality* in every insecticide shipment.

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LOOK TO POWELL...FOR CONSISTENT, TROUBLE-FREE QUALITY

Announcing... MICRO-CEL®

a new insecticide absorbent-grinding aid that cuts formulation costs

Developed by Johns-Manville research . . . provides lower cost 75% DDT wettables for export

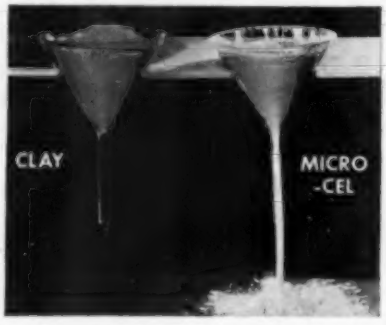
Johns-Manville has developed a new line of synthetic calcium silicates with unusually high absorptive capacities, large surface area, small particle size and excellent dry-flow properties. Called Micro-Cel, this new diluent is designed specifically for the production of free-flowing high percentage concentrates with either dry, viscous or liquid poisons.

Among the high concentrate wettable powders which have proven commercially practical are:

70% TOXAPHENE · 15% ARAMITE · 75% DDT
50% HEPTACHLOR · 75% DIELDRIN

Cuts costs to a new low

The high absorption of Micro-Cel permits the use of greater amounts of low-cost diluents. In addition, this high absorption results in a lower surfactant cost. All this means substantial formulation savings.



Flows like a liquid—Micro-Cel maintains its exceptional free-flow properties even after absorbing high concentrations of poisons.

Excellent storage properties

Formulations of 75 per cent DDT wettable powders based on Micro-Cel, as developed by Johns-Manville Research, will meet government specifications. Suspension values after storage of 1.5 to 2.0 can be achieved.

Meets tropical storage test—Suspension values of 1.5 to 2.0 after storage can be achieved in 75% DDT wettable powder formulation when based on Micro-Cel.

Dust concentrates

As a grinding aid in the preparation of dust concentrates, Micro-Cel's high absorptive capacity, free flowability and fine particle size of less than 0.1 micron make possible preparation of higher concentrates at lower costs. Examples of dry dust concentrates which have been proven commercially practical are:

70% TOXAPHENE · 50% ARAMITE
50% HEPTACHLOR

Johns-Manville MICRO

Micro-Cel for fertilizers

Micro-Cel is especially effective against caking of deliquescent products. It provides excellent insurance against caking of fertilizer compounds even after prolonged storage.

Test quantities and formulations available

Micro-Cel is now being produced on a pilot plant basis. Full-scale production is anticipated early in 1956. Sample quantities, as well as limited carload shipments for plant tests, are now available. We will also send you further data and formulations developed and tested in our laboratory for whichever poisons are of interest to you. If you desire, a Celite engineer will be glad to work with you in adapting Micro-Cel to your particular requirements and specifications. Write now in order to be ready with new improved products for the next crop year.

TYPICAL PROPERTIES OF MICRO-CEL GRADES

Grade	Color	Absorption % by Weight Oil	Absorption % by Weight Water	Density Loose Weight lbs./cu. ft.	Surface Area Sq. Meters / gram
8A	off-white	400	425	8	150
8B	off-white	225	200	15	150
8C	white	400	425	9	175
8D	off-white	300	350	12	100
8E	off-white	425	475	6	95

Average ultimate particle size is in range of 0.02-0.07 microns
pH—8.0-10.0

Johns-Manville, Box 60, New York 16, N. Y.
In Canada: Port Credit, Ontario.

☐ Please send me further information and samples of Micro-Cel. I am also interested in formulations for the following poisons:

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☐ Please have your local representative contact me.

Name_____

Position_____

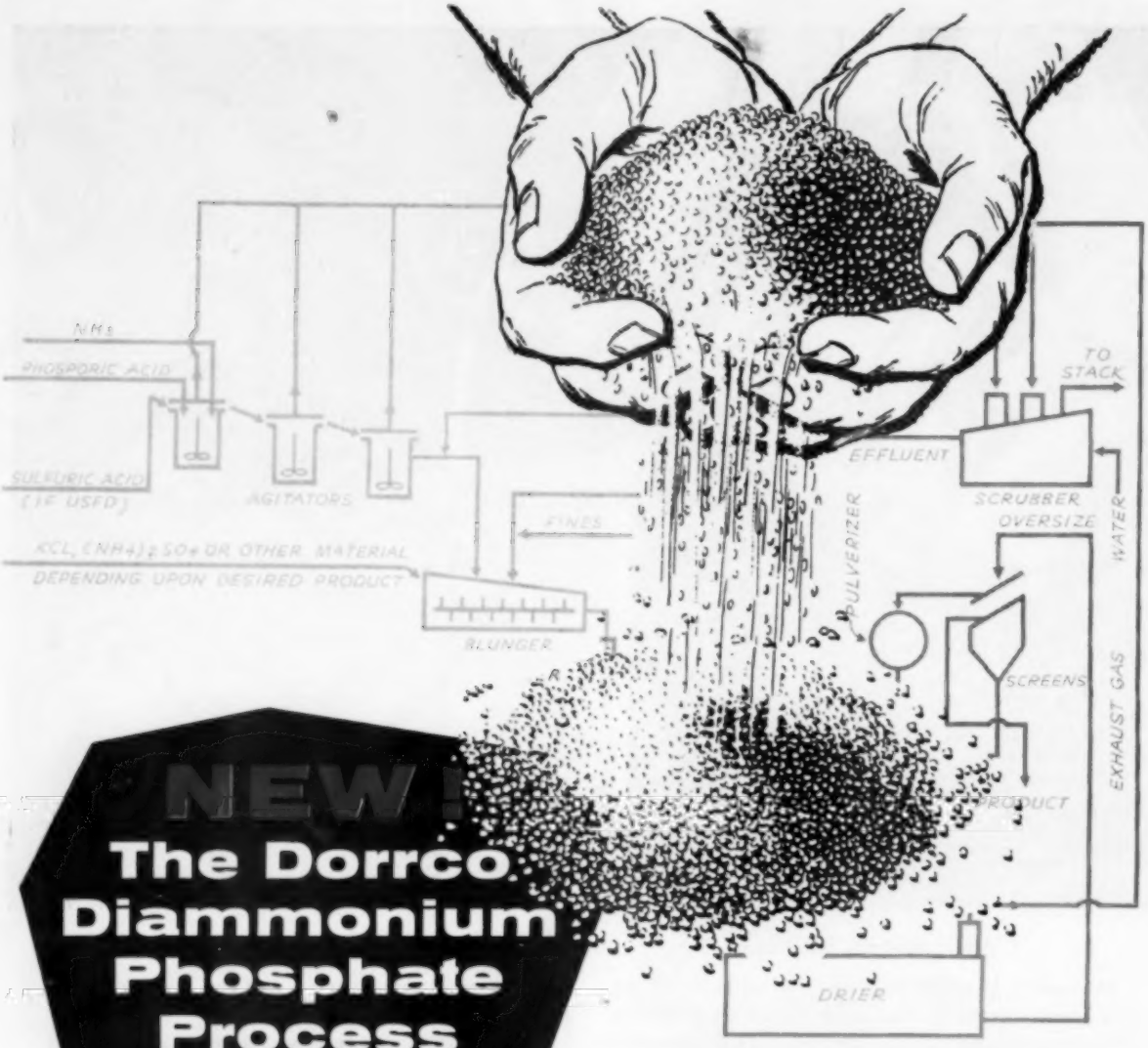
Company_____

Address_____

City_____ Zone_____ State_____

-CEL SYNTHETIC CALCIUM SILICATE

A PRODUCT OF THE CELITE DIVISION



NEW! The Dorrco Diammonium Phosphate Process

Proved out at Missouri Farmers Association Granular Fertilizer Plant...

The first commercial production of diammonium phosphate based fertilizers took place last November at the new MFA Fertilizer Plant near Joplin, Missouri. Full design capacity of 200 TPD was reached less than three months later. An improvement in the Dorrco Granular Fertilizer Process, this new method can be readily adapted to existing plants.

The Dorrco Diammonium Phosphate Process can produce directly from 32% P_2O_5 acid a fertilizer analyzing approximately 18-48-0 (N-P_2O_5-K_2O basis). Iron, alumina and other elements go directly into the product where they assist granulation. The use of dilute phosphoric acid, purification by filtration and crystallization are all avoided. Final product is composed of closely sized, spherical, free flowing granules and size can be controlled over a wide range by proper selection of screens. The presence of a small percentage of monoammonium phosphate insures stability of the product.

If you're interested in diammonium phosphate fertilizers, let us send an engineer to discuss this new development from the standpoint of economics and process. No obligation, of course.

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INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

Unexcelled for Storage STABILITY in chlorinated insecticides . .

TOXIMUL 600

. . and a star for VERSATILITY too . . !

TOXIMUL 600 is one of the most useful members of the Toximul series of agricultural emulsifiers . . and one of the biggest reasons for its immediate popularity is its *Super Stability* in storage. Accelerated storage tests carried out at 60° C. have shown TOXIMUL 600 to be superior in heat stability to all other emulsifiers tested.

This improved product has been specially developed to reduce the hazards of lost emulsifiability when liquid sprays are carried over from season to season. No matter how simmering the summer heat wave, formulations made with TOXIMUL 600 "stay put", ready for immediate use, with almost all of the major toxicants on the market.

OUTSTANDING SPONTANEITY is also an important TOXIMUL 600 feature, giving in a flash slow-creaming emulsions which will not separate out during spraying.

VERSATILITY is yet another "plus" performance factor with this Ninol product. You can use it at the 3 to 4% level, not only with Toxaphene and Aldrin, but also with DDT, BHC, Chlordane, Endrin, Hepcachlor and other leading toxicants.

Stability—spontaneity—versatility—it's a hard combination to beat. Why don't you change to TOXIMUL 600, too?

NINOL Detergents— —Emulsifiers

★ Write for Samples . .

SEND THIS COUPON NOW!

NINOL LABORATORIES, INC.,
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1719 S. CLINTON STREET
CHICAGO 16, ILLINOIS

Gentlemen:
Please send working samples of and complete information about TOXIMUL 600.

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Street _____

City & State _____

NINOL LABORATORIES, INC.

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complete ammoniation

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Your best assurance for a *continuous* supply is a completely integrated supplier!

Kraft Bag Corporation comes closest to being the most completely integrated manufacturer of multiwall shipping sacks in the industry!

Check this chart and see for yourself why Kraft Bag Corporation should be your supplier!

Tell us when we may call to discuss your requirements.

FEATURES	KRAFT BAG CORPORATION	OTHER SOURCES ?
Forest Lands	✓	
Pulp Mill	✓	
Bleach Plant	✓	
Paper Mill	✓	
Multiple Bag Plants	✓	
Natural Kraft	✓	
Colored Kraft	✓	
Bleached Kraft	✓	
Creped Kraft	✓	
Wax Laminated Kraft	✓	
Asphalt Laminated Kraft	✓	
Wet-Strength Kraft	✓	
Water Repellent Kraft	✓	
Stak-LOK Super Rough Kraft	✓	
Valve Bags—sewn or pasted	✓	
Open Mouth Bags—sewn or pasted	✓	
Flat Sewn Valve Bags	✓	
Flat Sewn Open Mouth Bags	✓	
KRAFT-lok Valve Closure	✓	
Creped Tape	✓	
Gummed Tape	✓	
Filter Cord	✓	
Sewing Thread—(the only material we do not produce ourselves)		
1-2-3-4 Color Printing	✓	
Art Department	✓	
Bag Development and Research	✓	

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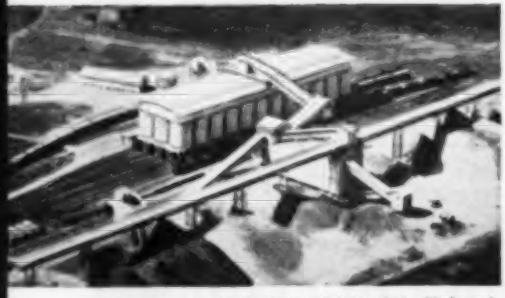
for over 85 years a symbol of quality and reliability



From the air—wet rock storage and drying plant, with dry rock storage silos in background. These silos, 29 in number, have a total capacity of 40,000 tons of dried rock. Under the silos are four runways where 40 railroad cars can be loaded at a time.

principal AA QUALITY products

All grades of Florida Pebble Phosphate Rock
AA QUALITY Ground Phosphate Rock
All grades of Complete Fertilizers **Superphosphate**
Gelatin **Bone Products** **Salt Cake** **Ammonium Carbonate**
Sulphuric Acid **Fluosilicates** **Insecticides and Fungicides**
Phosphoric Acid and Phosphates
Phosphorus and Compounds of Phosphorus

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30 FACTORIES AND SALES OFFICES, SERVING U.S., CANADA AND CUBA—ASSURE DEPENDABLE SERVICE

INDUSTRY MEETING CALENDAR

Nov. 28-29 — Oklahoma Plant Food Assn., Memorial Union, Stillwater, Okla.

Nov. 28 - Dec. 1 — Entomological Society of America, Annual Meeting, Netherlands Plaza, Cincinnati.

Dec. 5-7 — Chemical Specialties Manufacturers Assn. Roosevelt Hotel, New York City.

Dec. 5-9 — Exposition of Chemical Industries, Convention Hall, Philadelphia.

Dec. 5-7 — Agricultural Ammonia Institute, Kansas City, Mo.

Dec. 6-8 — North Central Weed Control Conference, Omaha Civic Auditorium, and Hotel Fontenelle, Omaha, Neb.

Dec. 15-16—Beltwide Cotton Production Conference, Hotel Peabody, Memphis, Tenn.

Dec. 28-30 — American Phytopathological Society of America, Biltmore Hotel, Atlanta, Ga.

Dec. 29th — American Association for the Advancement of Science, Municipal Auditorium, Atlanta, Ga.

Jan. 4-6—Weed Society of America, Hotel New Yorker, New York City.

Jan. 10-11—North Carolina School, North Carolina State College, Raleigh, N. C.

Jan. 11-12—Wisconsin Insect Control Conference with Industry, Lorraine Hotel, Madison, Wisc.

Jan. 15-18 Conference of California Mosquito Control Association, Elks Club, Marysville, Calif.

Jan. 16-17—Annual Arborists School, New York State Arborists Association and State University of New York, Hotel Onondaga, Syracuse, N. Y.

Jan. 16-18 Southern Weed Conference, Hotel Jung, New Orleans.

Jan. 16-18 — N. W. Vegetable Insect Control Conf., Imperial Hotel, Portland, Ore.

Jan. 18-20 — Western Cooperative Spray Project, Imperial Hotel, Portland, Ore.

Jan. 19-20 Northeastern Mosquito Control Association, Waltham, Mass.

Jan. 24-28 — Midwestern Garden Supply Trade Show, International Exposition Hall, Chicago.

Jan. 26-27—Custom Spray Operators' Training School, University of Illinois, Illini Union Ballroom, Urbana, Ill.

Jan. 27 — Colorado Agricultural Chemicals Association, joint meeting with Colorado A & M College, Cosmopolitan Hotel, Denver, Colo.

Jan. 30-Feb. 3—Illinois Pest Control Operators, Purdue University, Lafayette, Ind.

Feb. 6-8 — Cotton States Branch of the ESA and Southern Agricultural Workers, Biltmore Hotel, Atlanta.

Feb. 7-9 — N. Y. Garden Supply Trade Show, Kingsbridge Armory, New York City.

Feb. 15-17—California Weed Control Conf., Sacramento & Davis, California.

Feb. 20-21 Southwestern Branch, Entomological Society of America, Hotel Texas, Ft. Worth, Texas.

March 14-18 National Agricultural Chemicals Assn. Hollywood Beach Hotel, Hollywood, Fla.

March 28-30—North Central States Branch of ESA, Purdue Memorial Union, Lafayette, Ind.

AS WE GO TO PRESS . . .

Eastern Entomologists Hear Talks On Resistance, Newer Insecticides

MORE than 250 entomologists in the Eastern section of the country took a preliminary look at the year's results in regional entomological activities in Baltimore late last month before heading for the national ESA convention in Cincinnati a week later.

The occasion was the Eastern Branch Meeting of the Entomological Society of America, held in the Lord Baltimore Hotel, Nov. 21-22. At the meeting's close, many of the entomologists present prepared to head for the national convention, which was underway at press time.

Papers presented at the meeting covered the whole gamut of entomology, including topics of concern to the various states and areas in the eastern section of the United States. Conclusions of the speakers were varied, and it would be impossible to summarize the general tenor of the technical reports. However, from the standpoint of the pesticide industry, there were several recurring themes that should be noted in making plans for sales next spring.

The old familiar story of insect resistance to insecticides, most notably to DDT and other chlorinated hydrocarbons, was repeated and reinforced by several of the research workers. In some cases, entomologists found it helpful to return to pre-war materials for control. In a majority of talks, however, the speakers emphasized that tests with the newer chemicals are continuing, with emphasis placed on new combinations of pesticides, use of improved diluents and carriers, and better engineered spraying equipment to improve control.

For instance, Clyde C. Hamilton, of Rutgers University, New Brunswick, N. J., showed a film of an ingenious mist blower that he said has been highly effective in controlling nursery plant pests in New Jersey. Using BHC, Lindane, DDT, and some of the newer phosphates, the mist sprayer provided more effective control than previous spray programs.

Two cases of insect resistance, in New York and Virginia, were discussed by F. L. McEwen and R. N. Hofmaster, respectively. The former, of the New York State Agricultural Experiment Station, said that he received reports during 1955 that DDT was not doing a good job against cabbage loopers. There followed tests with many chemicals, with the conclusion that both Shell Chemical Corp.'s OS 2046 and Endrin gave good control, DDT poor control and the phosphate 17147 1 intermediate. Furthermore, while the chemicals were ineffective when applied alone, a combination of Toxaphene and Parathion was considerably better. More and more DDT is needed each year to assure control of the loopers, he reported, indicating that the future for this insecticide, in this regard, may be very limited.

Likewise, Dr. Hofmaster, of the Virginia Truck Experiment Station, reported that the Colorada potato beetle has displayed resistance to DDT. "Aldrin and Heptachlor are very effective," he stated, and Dieldrin is good also. But he cautioned against too heavy or too frequent application of any insecticide, lest resistance be speeded.

Use of mineral oil to help penetrate corn ears with insecticides was described by W. A. Connell, University of Delaware. He found that the oil i mproved the effectiveness of DDT-Diazinon and DDT-Aldrin combinations on corn.

Trapping instruments and temperature studies can make the problem of pest control research easier, J. A. Adams, New York State Agricultural Experiment Station, believes. He said insect counts in the traps can be correlated with temperatures to help predict strength of developing infestations. With this knowledge, control measures "can be adjusted week to week," he said.

Low gallonage spray applications — 30 gallons per acre at 60 lbs. pressure — were used last summer in New Jersey for alfalfa weevil control in New Jersey, according to another talk, by R. S. Filmer, of Rutgers Univ. He said dieldrin showed up best for the pea aphid; malathion and parathion also giving good control.

On the question of diluents and carriers, another speaker told about some interactions between the diluents and the pesticides that were noted. Donald E. Weidhaas, Cornell University, Ithica, N. Y., said that color changes and catalytic changes were noted in a few cases. He did not want to interpret the importance of these inter-actions, however, and said that tests are continuing.

The public relations work pesticide companies are undertaking to educate the general public in the destructive effect of insects was typified in a film showed by W. E. Dove, Fairfield Chemical Division, Food Machinery and Chemical Corp., Baltimore. The film showed how grain insects alone destroy $1 million worth of each year's harvest. It went on to tell about control programs that have been set up, using the company's Pyrenone insecticide, which is based on pyrethrum.

George C. Decker, president of ESA; Robert H. Nelson, recently appointed executive-secretary of ESA; and Bailey B. Pepper, Eastern Branch representative; addressed the meeting, describing some of the activities of the national office.

F. W. Poos, of the USDA Forest Service in Connecticut, was moved up from vice-chairman of the Branch to succeed Ellsworth H. Wheeler as chairman, and C. C. Alexander, of Geigy Chemical Co. was elected vice-chairman. B. F. Driggers continues as secretary-treasurer. A. B. Gurney is the new chairman of the program committee.

For next year, the group made tentative plans to meet at the Chalfonte-Haddon Hall Hotel, Atlantic City, Nov. 19-20.

California Fertilizer Association Elects W. E. Snyder as President

WILLIAM E. Snyder, Wilbur Ellis Co., Los Angeles, was elected president of the California Fertilizer Association at the 32nd annual convention held November 6-8 at the Mark Hopkins, San Francisco. He succeeds B. H. Jones, Sunland Industries, Inc., Fresno, retiring president. New vice-president is Jack Baker, Bandini Fertilizer Co., Los Angeles. Wm. G. Hewitt, Pacific Guano Co., Berkeley, is treasurer and Howard Hawkins, Golden State Plant Food Co., Glendora, secretary, Sidney H. Bierly continues as executive secretary and manager.

Attendance reached a new high of 600, and with the theme of the convention centered on "expansion," changes in the by-laws were voted which will make fertilizer distributors and aqua ammonia converters eligible for membership in the future. To provide expanded representation on the association's board of directors, the number of directors was increased from nine to twelve. New directors elected to the board included Mr. Hewitt and Mr. Hawkins, Virgil A. Frizzell, The Triangle Co., Salinas, and M. M. Stockman, Mountain Copper Co., San Francisco.

Featured on the convention program was a panel discussion on marketing. Dr. Daniel G. Aldrich, Jr., Univ. of California, moderator, suggested that the greatest opportunity for the fertilizer industry to expand future sales lies in introducing new consumers to the use of fertilizers. Dr. Guy F. MacLeod of Sunland Industries, Fresno, outlined the qualities and technical training which the ideal fertilizer salesman should possess.

Sources of information that are available to acquaint sales personnel with information that will help them in their jobs were reviewed by F. H. Leavitt, Shell Chemical Corp., San Francisco, another panel member. Basic considerations to be taken into account in making recommendations for fertilizer use were discussed by Dr. J. E. Knott, Univ. of Calif., Davis. He referred to the need to accumulate information from many tests to determine results from specific fertilizer applications before recommendations can safely be made.

Dr. Russell Coleman, executive vice-president of the National Plant Food Institute, was another convention speaker. He outlined the national program of NPFI to broaden the fertilizer market, referring to the NPFI fertilizer information program for bankers, its posters, booklets, films, advertising mat service, etc. Dr. Coleman indicated his own belief that farm income will not be allowed to drop further over the years ahead, and asserted that "what happens to the fertilizer consumption curve in the next five years depends on how much sales effort the industry puts out. This is the challenge to the industry, the challenge to make an all-out effort to keep the plant nutrient consumption curve rising."

ESA Discusses Enforcement of Miller Pesticide Law

A PANEL discussions on the enforcement of the Miller Pesticide Residue Amendment is featured at the third annual meeting of the Entomological Society of America, being held Nov. 28-Dec. 1st at the Netherland Plaza Hotel, Cincinnati, Ohio. Retiring president George C. Decker, Illinois Natural History Survey and president-elect B. A. Porter, USDA, Agricultural Research Service, presided at the opening sessions, welcoming some 400 members and guests.

"County Agents tell us that 25 to 30 percent of their calls are on insect problems" Dr. Decker reported to the group in his presidential address. "Few of these agents have had any training in entomology, and the crying need is for more extension entomologists to translate research into action programs, and fortify these agents now so closely connected with our food production."

Dr. Decker suggested to the group that "We are rapidly approaching the day of 'prescription entomology.' Large cotton plantations, canning companies and land management agencies now employ trained entomologists to check crops, measure insect population levels and recommend appropriate specific control measures, or even supervise their application.

"Perhaps in the not too distant future, entomologists will establish offices at strategic locations and begin the practice of entomology on a basis comparable to veterinary medicine," he concluded.

Among the reports and addresses scheduled for presentation was a symposium on "New Approaches to Systematics," at which T. H. Hubbell presided. In the section meeting on chemical control investigations, at which B. B. Pepper was scheduled to be chairman, the following discussions were expected:

"Control of the European Corn Borer with Granulated Insecticides" . . . H. C. Cox and T. A. Brindley.

"Application Equipment" . . . W. G. Lovely, H. C. Cox, and T. Brindley.

"Residues" . . . J. Fahey, H. Rusk and H. C. Cox.

"Effectiveness of Several Insecticides and Formulations in control of Seed Weevils in Crimson Clover" . . . C. M. Beckham.

"Resistance in the Boll Weevil to Chlorinated Hydrocarbon Insecticides" . . . J. C. Roussel.

"Resistance of Codling moth to DDT Sprays" . . . D. W. Hamilton.

A meeting on Control, Extension and Regulatory Entomology, included discussions on "Responsibilities of the U. S. Department of Agriculture" by J. T. Coyne and a report on "Responsibilities of the Producer" by Lea S. Hitchner, NAC.

P. W. Oman was chairman of the program committee, and R. W. Rings was chairman of the local arrangements committee.

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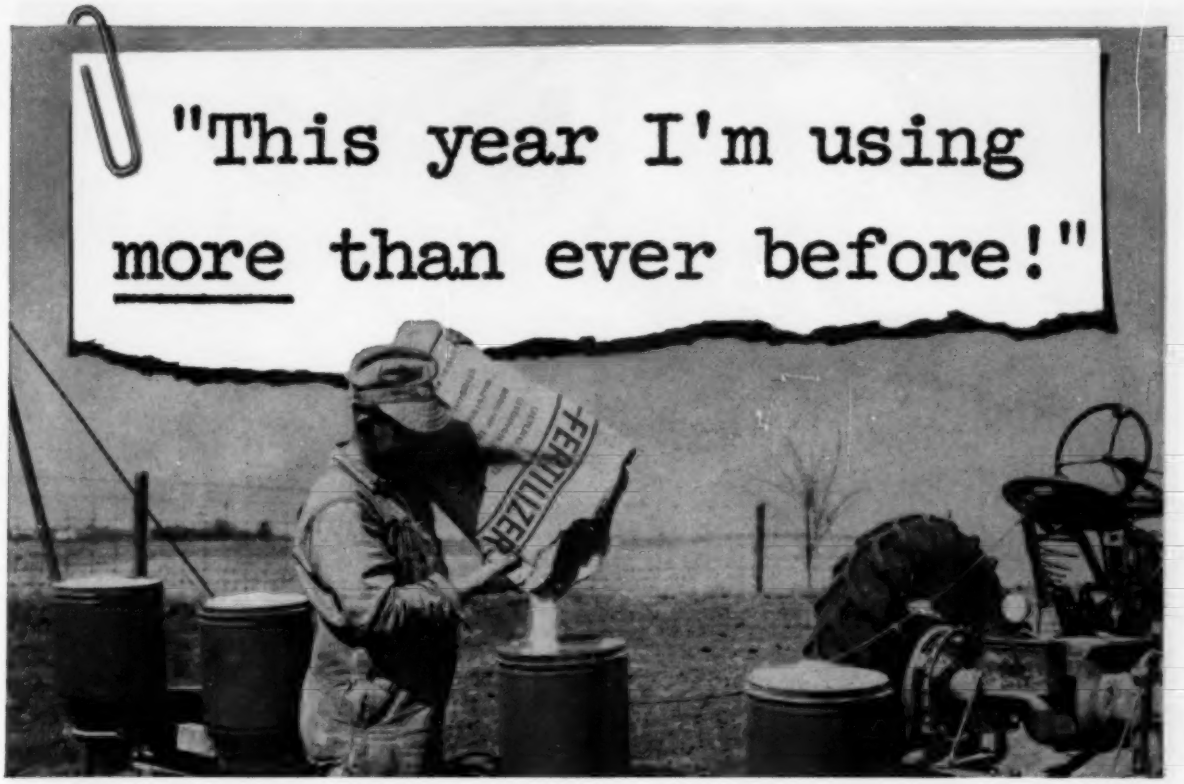
The farmer is in a cost-price squeeze today. He is faced with acreage restrictions, lower prices for crops he sells and higher costs for things he has to buy.

Fertilizers are vital to farm profits, because fertilizers produce big extra yields from smaller acreages, thus assuring a greater return from land, labor, machinery and other fixed expenses.

The importance of fertilizers in the present situation should be brought strongly to the attention of the farmer. Nitrogen Division, Allied Chemical & Dye Corporation, is doing something about it!

The advertisement shown on the opposite page is the opening gun in a powerful and continuing campaign directed to the attention of more than 3½ MILLION readers of farm magazines.

This campaign will serve the best interests of the farmer, the fertilizer manufacturer, the county agent, the country banker, the experiment station, the extension service and all others interested in a profitable agriculture.



THIS YEAR many of the best farmers are using more fertilizer than ever before. With farming costs going up and farm profits coming down, they want the extra yields of high-quality crops that fertilizer adds to every acre at such low extra cost.

Figure it out for yourself. Your investment in land, labor, seed, machinery, insect control and other fixed expenses is the same whether your yields are high or low. When you double or triple your yield through the use of more fertilizer, you have two to three times as much crop income to carry your fixed expenses. Your only extra costs are the cost of the fertilizer and harvesting the extra yield. The extra yields added by fertilizer are the lowest cost and most profitable share of your crop. You are in better shape to make a good profit despite low crop prices, acreage restrictions and other conditions beyond your control.

If you grow corn, for example, do you know how many bushels per acre you have to produce to cover fixed expenses? In one state the break-even point is 40 bushels per acre. In another state it varies from 30 to 70 bushels per acre depending on the value of the land. If your break-even point is 40 bushels and your yield is 35 bushels, you've lost money. But, if you use enough fertilizer to increase your yield to 100 bushels per acre, you make a big profit.

First consideration should be given to the important economic fact that a bushel or a pound of any crop can be produced much more economically when the yield is high than when the yield is low. The yield per acre bears a positive relation to the cost of production and the yield is dependent on the fertility of the soil.

Fertilizer is your best investment. The price of fertilizer has not gone up like the prices of many other things the farmer buys. Fertilizer grows farm profits. Returns from thousands of tests show that $1 invested in fertilizer produces an average return of $3.75 in extra yields. On many crops the return is much higher. Put more fertilizer to work for you. It's your best answer to the present farm situation.

The fertilizer industry serves the farmer. Nitrogen Division serves the fertilizer industry as America's leading supplier of nitrogen for use in mixed fertilizers.

See Your County Agent

Ask your County Agent to recommend the analyses and the amounts of fertilizers best suited to produce big yields of the crops you grow on your soil. His advice to you is based on the latest official recommendations from your Extension Service and Experiment Station.

See Your Banker

Bankers are alert to good investments. They know that fertilizer pays a big return in the short period of a growing season. If you need money to buy more fertilizer, most bankers consider the extra yields produced by fertilizer as an excellent risk.

See Your Dealer

Your fertilizer dealer can supply you with a good brand of fertilizer in the amounts and analyses as recommended by your County Agent. Help your dealer to get your fertilizer to you on time by placing your order early and accepting prompt delivery. Use more fertilizer than ever before and have it on hand when you need it. Remember, fertilizer grows farm profits. Use enough to really pay you big!

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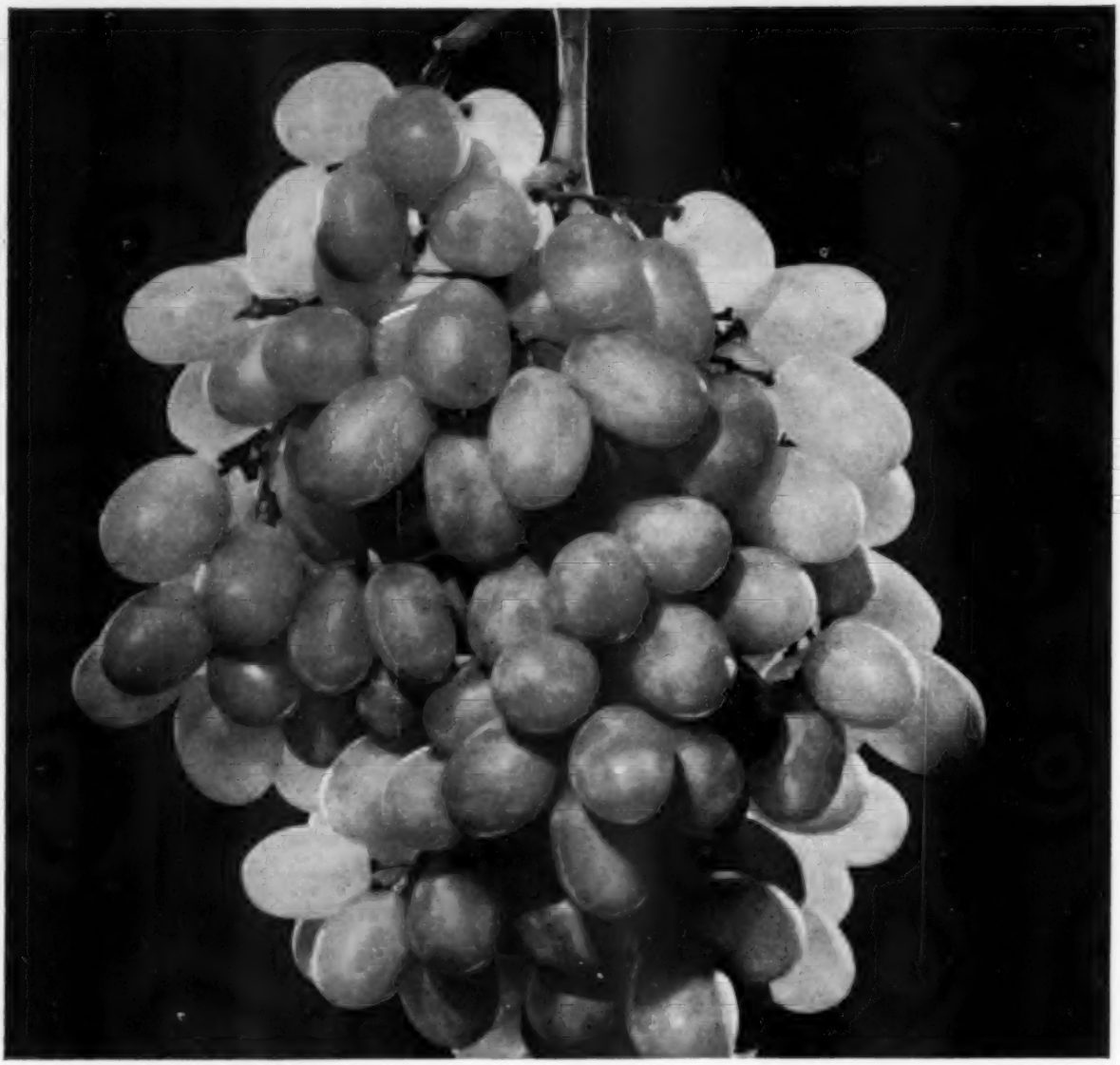
Fertilizer Grows Farm Profits



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Potash, a vital component of these fertilizers, not only enriches the soil, but protects crops against disease and increases yield and quality.

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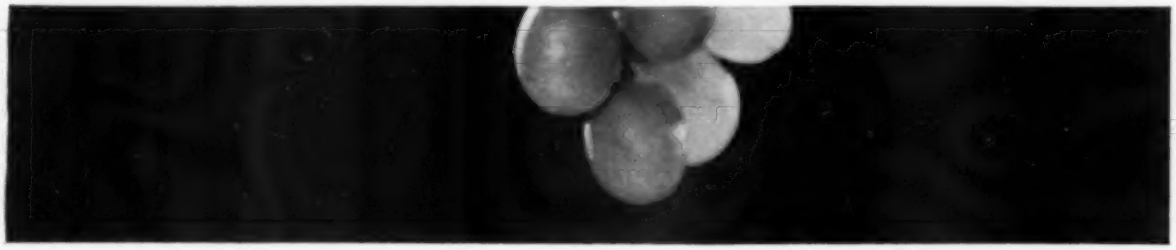

Bad news for him . . . good news for you

Just Off Press . . .

. . . the current issue of Attaclay Pesticide Digest, discussing various aspects of pesticide processing. Write for your copy, and future Digests as published.

Could it be this worried army worm is reading his own death warrant in the Attaclay Pesticide Digest? Oh, well . . . his hard luck is your good fortune.

The article—so disturbing to the worm—tells how Attaclay's over-all efficiency and flexibility *give you maximum production of dust bases and wettable powders.* Attaclay is the formulator's star performer when the rush season is on . . . when men and equipment often are asked for a production rate that's far in excess of plant capacities.

Attaclay gives you a big margin in sorptivity to get the most out of reduction mills . . . cycle times in ribbon blenders are speeded up . . . and the milling or grinding operation following liquid impregnation goes much faster and easier. This same sorptive capacity keeps dusts on the double-quick through conveyors, hoppers, chutes and packaging machines.

Attaclay's efficiency extends to the full range of synthetic organic pesticide chemicals. With only *one* across-the-board carrier and diluent to stock, you save time, trouble, and money in ordering, warehousing, scheduling, and handling.

Our suggestion! Depend on Attaclay to keep your plant producing premium products at speediest rate. We're pleased to offer large free samples and technical help.

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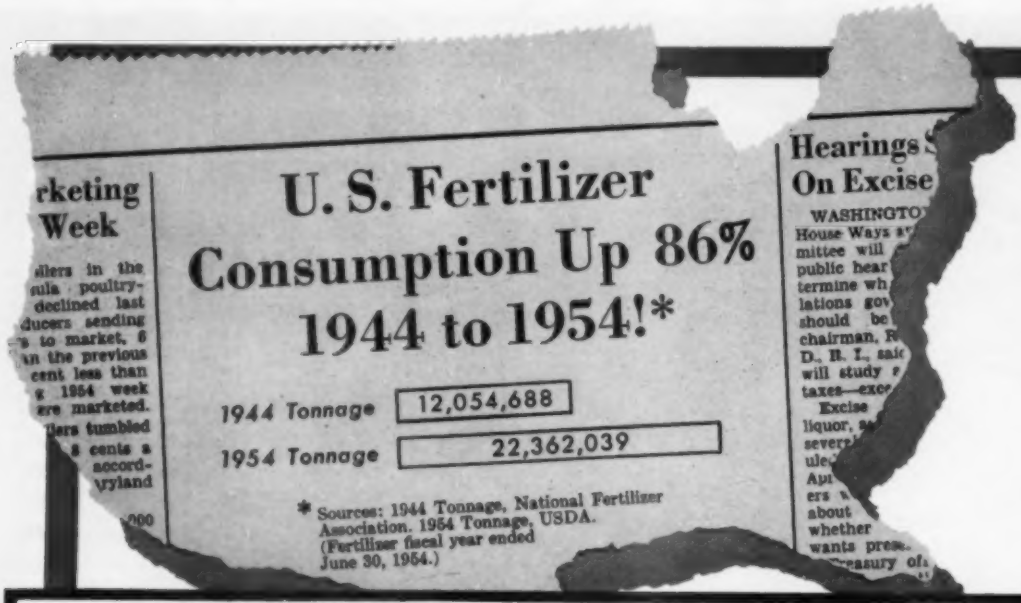

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Editorial COMMENTS

THE pesticide industry has grown to expect that a certain number of scare stories will crop up from year to year to frighten the public into believing that agricultural chemicals are causing all sorts of diseases. Industry associations spend a good deal of time and money setting the story right; but it is a never-ending job, and one that has been made more difficult in recent years because a few medical doctors have taken up the cry against insecticides. That is why it was comforting to hear a medical man — B. E. Conley, secretary of the Committee on Pesticides of the American Medical Association — talk on the subject at the recent meeting of pesticide control officials in Washington, D. C.

Dr. Conley's committee is continually studying the problems of accidental poisoning; disseminating useful information on toxicology both to the general public and to physicians. The AMA group uses radio programs, recordings, exhibits and symposia to get its story across.

"The human element makes complete success impossible", Dr. Conley admitted, in citing the achievements of his committee. He emphasized that the "chemicals cause disease" hobgoblin is not new, and that it is not limited to faddists. Referring to the medical men who have created a furor in the general press, he blamed them for making "too sweeping statements". Although the belief persists in some quarters that DDT and other products cause disease "a majority of doctors discount these ideas", he added. "There is scarcely a reaction from pesticides that is not similar in symptoms to other causes."

Many of us have been saying that for a number of years, but it is always comforting to have medical support.

* * * * *

THE suggestion is advanced elsewhere in this issue (see pg. 60) that more success might be achieved in persuading farmers to up their fertilizer application rates if emphasis were placed on the excellent results obtainable from moderate rates of application, rather than always emphasizing, as we so often do, the top yields obtained from peak applications occasionally employed. This commentator suggests that in concentrating attention on these unusually high rates of application and yields, it may be that some farmers are actually scared off, when by a different approach they could be persuaded that a modest increase in their rate of fertilizer usage would definitely represent a sound investment.

Whatever the answer to this particular question, the fact remains that as long as millions of farmers are failing to employ commercial fertilizers at recommended rates there is an educational job which remains to be done, — a job for the fertilizer industry, the agricultural experiment stations and in fact all those who advise the farmer. Those farmers who are still hesitant to use recommended rates of fertilizer need to be convinced through on-the-farm demonstrations that high fertilizer use pays in increased crop yields.

Responsibilities of Pesticide Salesmen

IN OUR work of administering California's laws pertaining to agricultural chemicals, we attend meetings of various groups, and in many of the meetings the discussion revolves around the pesticide salesman and the part he plays in our agricultural economy. In industry meetings, the salesman is commonly pictured as a stalwart soul in shining armor, carrying the light and the message out into the dark world. He is the middleman between the manufacturer, who has wrested the scientific truth from nature in his laboratory and forged the weapons of defense, . . . and the farmer who without the weapons would succumb, economically if not personally, to the ravages of insects, pestilence, and disease. In other meetings, annoyed officials, agricultural advisors and disgruntled farmers picture him as a dark creature with horns and tail who coerces the farmer into buying worthless materials for control of pests that aren't present, and buying materials that destroy more of the crop than the pest would have done. Personally, we have never had the opportunity to see a pesticide salesman in either of these splendid roles. The pesticide salesmen we meet are just ordinary fellows like ourselves, who are trying to do a good job in a complicated and sometimes baffling field.

Although the two groups of people paint such a different picture of the pesticide salesman, they both agree on his importance. It is in recognition of his importance, and not with the implication that he is conspicuously in need of a moral lecture, that we are now considering his responsibilities.

Section 1066.1 of the Agricultural Code of California establishes what might be regarded as the minimum level of responsibility required of a pesticide salesman. It states:

> "Any person is guilty of a misdemeanor who, by himself, or through another, in connection with the sale of any substance or mixture of substances included within the scope of this article:
>
> (a) Makes any material or substantial misrepresentation.
>
> (b) Makes any false promises of a character likely to influence, induce or deceive.
>
> (c) Engages in illegitimate business or dishonest dealing.
>
> (d) Causes to be published or distributed false or misleading literature, or causes to be displayed false or misleading advertisements."

It has rarely been necessary to file charges under this section. In most cases, when complaint of misrepresentation has reached our office, we have held a hearing to investigate the report. The salesman, the farmer, the manufacturer, and other interested persons have been invited to meet and discuss the matter together. It is generally found that the trouble arose not from misrepresentation, but from misunderstanding and a failure to provide the farmer with a clear picture of what he should have done with the pesticide or what precautions he should have taken.

We have heard charges that salesmen promoted use of pesticides when treatment was not needed. We have been told of a salesman who industriously swept a field with his net back and forth up and down until he had an impressive collection of miscellaneous bugs to show the farmer and to alarm him into making an unnecessary or premature application of a pesticide.

We have heard complaints that salesmen spread unwarranted rumors that competitive products were cancer-producers, that competitive products would leave residues subjecting the farmer to lawsuit and his crops to condemnation, and that competitive products affected the taste of crops to which they were applied. It is difficult to evaluate some of these reports, which Tom thought that Dick had heard from Harry. These things happen rarely, everyone agrees that such alarms hurt the pesticide industry, and there is little point in discussing them further.

More commonly the complaints that are made about pesticide salesmen do not charge them with doing something that they should not do, but rather failing to do something that they should do. In other words, they are sometimes charged with not doing a full job.

We have heard complaints that salesmen failed to inform farmers that certain precautions were needed to prevent damage to his crop or injury to himself. Salesmen failed to tell him of certain requirements of law, for example that a permit from the county agricultural commissioner was needed to apply calcium arsenate dust, parathion, 2, 4-D and certain other

compounds in California. They failed to warn him of the hazard of drift onto his neighbor's crop, the hazard to livestock, or to honeybees. They failed to tell him about proper disposal of emptied containers. They failed to tell him about the incompatibility of one pesticide with another in the farmer's spray program. They failed to warn him that late applications would leave excessive residues on his crop at harvest time, and that brings us to the big topic of the day.

Among the problems that face the farmer, and consequently the salesman, the one most commonly discussed in recent months is the matter of spray residues. Everyone agrees that a farmer has not been served well if he controls his pests in a manner that makes his crop unmarketable because it bears excessive residue, but there is a very real problem of knowing what can be recommended that will do the job of pest control, knowing when it can be used and yet keep the residue on the crop within tolerance limits. How much residue is on a crop after it has been treated with a pesticide? This is one of the questions that manufacturers, salesmen, processors, and agricultural advisors are asking, and with good reason.

Lea Hitchner, executive secretary of the National Agricultural Chemicals Association, has said, "If some grower's crop is seized and condemned because of a residue in excess of a tolerance or for which no tolerance has been established, he will undoubtedly seek to recover the value of the crop. If he can establish that such illegal residue resulted from following a company's recommendations or directions for use, that company may be found liable."

There is a great need for dependable knowledge of the amount of residue that can be expected from certain treatments on certain crops, and how fast these residues disappear. Without such information, recommendations cannot be made with certainty, and the grower cannot plan his program. We need this information and we need it now. We need to known the fate of pesticide residues on local crops under local conditions, and we need to have what is known made more readily available for use.

The pesticide industry has been the major factor in securing the information on residues that is now available. Much of the information that we do have comes from industrial laboratories, from analyses made by commercial laboratories for firms developing new pesticides, and from analyses made under grants of money the industry has made to state and federal research projects. This vast amount of information that has already been secured needs to be pooled, assembled, digested and made available as a basis for recommendations in light of the present residue tolerances.

There is slowly developing what might be regarded as a standard or semi-official schedule of the latest application that can be made of each pesticide on each crop to keep residues within tolerances. Official rulings or an officially-adopted timetable are requested by manufacturers preparing labels for their products, by advisory agencies preparing recommendations for control of certain pests, by processors seeking some assurance against being involved in marketing over-tolerance produce, and by pesticide salesmen who want to know how close to harvest their own product and competitive products can be applied.

However, the amount of residue left on treated produce depends upon a number of other factors in addition to the time of application. As the radio commentators say, it will be denied in official quarters that such an official schedule exists, and at least six good reasons can be given as to why such an exact schedule cannot be possible.

1. *What is the spray load on the produce immediately after application and how fast does it weather off the growing crop?* Francis Gunther and Roger Blinn, of the University of California at Riverside, are making an excellent contribution toward answering these particular questions in the forthcoming Annual Review of Entomology, in which they show some typical residues right after application and two weeks later, and calculate the half-life of many typical residues, on various plant parts.

2. *What dosage is applied?* All other things being equal, a crop sprayed with one pound of a pesticide per acre will probably meet a certain tolerance at an earlier date than the same crop sprayed with 10 pounds per acre.

3. *What other pesticide application is involved in the spray program?* It is evident that each treatment contributes something to the final residue. If a crop has been dusted each week for several months, probably the last application of a persistent pesticide cannot be made as close to harvest as it can be where the

(Continued on Page 107)

by
Robert Z. Rollins*

Assistant Chief, Bureau of Chemistry
California State Department of Agriculture

The pesticide salesman has more of a job to do than merely to sell his product. As the personal contact between manufacturer and farmer, he is expected to be a technical expert, keep customer advised of legal requirements (e.g. residue tolerances), the potential hazards of pesticides, etc.

Presented at the annual meeting of Western Agricultural Chemicals Assn., Berkeley, California, October 1, 1955.

FERTILIZERS and YOU

by **Vincent Sauchelli***

I HAVE had several opportunities to observe the agriculture of our southern neighbor country, Mexico. What I saw in their agriculture is in sharp contrast with that of our own country—*there*, a more or less antiquated system of farming in the process of making some real efforts toward modernization; *here*, perhaps the world's most modern scientific and most productive agriculture. The present administration in Mexico apparently realized that the primary need of the country is an increase in the production of food and in making that food available to the people in greater abundance and at lower prices. The drouth of 1953 somewhat defeated the emergency food production program sponsored by the Ministry of Agriculture. An integral part of the program is credit. This is being provided by the Government which also guarantees minimum prices to farmers. An expanded program for more intensive food production is currently underway. However, as I see it, one of the weaknesses in these programs is the relatively small consideration given to basic research and to extensive teaching and general farmer education. Much good has been accomplished through the efforts of the Rockefeller Foundation, which has worked in close cooperation with the Ministry of Agriculture during the past 8 years. They have developed new, improved varieties of wheat, corn, and beans, and better cultural practices, involving the use of chemical fertilizers and the improved management of soils. But compared with the general need of the country, what has been accomplished to date is only a drop in the bucket. Two deeply rooted problems face the Mexican government: the average farmer's general ignorance of the benefits obtainable from the application of commercial fertilizers; and the low level of farm income, which does not permit the purchase of fertilizers. As previously mentioned, the government has established 2 banks to provide liberal credit to farmers for the purchase of fertilizers and pesticides and farm implements. So far, both banks have consistently lost money on their loan operations which are regarded as in effect subsidies to the producer. The goal of the government program is to fertilize some 2,000,000 hectares (about 5 million acres) plus an annual consumption of about 1 million tons of fertilizers of all kinds—a consumption which would be about 20 times that of 1951-52.

So much for the situation in Mexico. My purpose in referring to the agriculture of Mexico was merely introductory to the subject of the role of commercial fertilizer in a country's economy.

Greater Efficiency in Farm Operations

NO one can seriously doubt that American agriculture can provide in abundance the food, fiber and feed our nation needs now and far into the foreseeable future. Through the results of research and education, our farmers have been taught how to increase the productivity of the soil, while at the same time conserving the country's top soil and water resources. American agriculture, with the aid of the indispensable fertilizer industry, has succeeded in creating an abundance of farm products—in fact, some would say, surpluses, which are the envy of less forunate countries. Well, abundance or surplus—let us not get in that state of mind where we fear abundance. Our business is not to worry or fear it—rather to learn how to share it among all our people. Abundance must be marketed profitably. We shall gain nothing by cutting back on useful production, for if we do, it will only mean less profitable production. Actually what we should do is to encourage farmers to reduce acreages and produce more from each remaining acre at a lower crop unit cost of production. Emphasis must be put on greater efficiency in the farm operation, in safeguarding farm prosperity, in research and education and new technology, so that food and

*Presented at a meeting of bankers and soil conservationists, July, 1954, Bartow, Florida.

fiber production shall ever be in abundance, and our national resources of soil and water be conserved. We cannot create these resources. Man cannot make land. But we can safeguard them and use them wisely so that we and future generations may enjoy them equally.

Mineral fertilizers are a key factor in conservation. I hold that conservation is a by-product of good farming. . . . That a farmer who can raise 150 bushels of corn or 50 bushels of wheat per acre is practicing better soil conservation than he who produces half that amount on each acre.

Although compared with agriculture in Mexico, for example, we have made great progress in conservation, soil-building and farming efficiency, we still, as a nation, have a great deal more to do. We are challenged on all fronts to exert more effort to bring about a more universal improvement in our agriculture. In the next 20 years, we in this country must add, in terms of food and fiber, the equivalent of about 130 to 150 million acres of cropland to our farm plant. Our population is growing at the rate of more than 2 million per year. Our total cropland comprises about 400 million acres to meet the needs of our human population. Commercial fertilizer is credited now with about 30 per cent of our total crop production. If we did not have fertilizers to use, it has been estimated we would require the equivalent of about 100 million acres additional cropland to produce what fertilizers contribute to our annual harvests. At the current degree of farming efficiency, the needs of the 1975 population in this country will require, according to the U. S. D. Agriculture estimates, the equivalent of about 530 million acres of cropland, which is about 4 acres for every 3 acres actually available today; but we are already short by nearly 100 million acres of meeting the needs of the 1975 human population.

The Role of Fertilizers

SOMEHOW we must meet this cropland acreage deficit. But how?

We already know many ways in which this can be met—stop losses caused by pests and diseases; improve marketing and distribution facilities, which at present cause great economic waste; improve likestock and crop varieties through breeding; and most important of all, save and improve the soil—the nation's greatest heritage. We can never forget that in the last analysis farm production and prosperity depend upon the soil. Need I add that mineral fertilizers are an indispensable aid in the improvement and maintenance of soil fertility? Almost every country in the world is doing something to increase its domestic production of chemical fertilizers. Fertilizers are on the agenda of things to be done by every country represented in the United Nations. Last year, American agriculture consumed upward of 21 million tons of all kinds of fertilizers, and about 18 million tons of agricultural lime. We are blessed in having a domestic fertilizer industry ready and willing to furnish the needs of our agriculture now and in the future. Other countries are not so fortunately situated.

Successful agriculture in the important farm areas of this country depends upon the generous use of fertilizers. In many southern states more than half of the total crop production can be credited to fertilizer usage. In Florida and other states of the deep south, commercial farming could not be carried on profitably without the application of chemical fertilizers. The rich farm lands of the Corn Belt became seriously depleted of their fertility after about a century of cropping, and this region, "the food basket of the nation," is now using an amount of plant nutrients in the form of commercial fertilizers equal to that of the South Atlantic Region, which up till now had held first rank in the consumption of fertilizers.

Farming is now a business, and American agriculture is the nation's biggest industry. Gone is the old-time pleasant sentiment linked with farming as a way of life. Agriculture is now competitive with other industries, and its leaders must do some hard thinking in economics if many of its products are not to be researched out of the market, like tallow and butter. The farmer and the credit agencies upon which he depends for loans will have to be made increasingly aware that in modern farming the use of proper fertilization is indispensable to profitable operation and the conservation of soil resources. Fertilizer is a proved, effective means of reducing the crop unit cost of production. Farmers in every agricultural region are beginning to understand that the maximum acre yields are one of the surest ways of keeping "above water" under all economic conditions. At present, farmers generally are not producing at maximum capacity. If American farmers could be induced to follow the fertilizer recommendations of their local agricultural experiment stations they would increase their cash farm income substantially because of their greater efficiency. If they did this generally, it is estimated that the present fertilizer facilities of the country might have to be increased substantially to satisfy the demand.

The Country Banker

HERE is where the country banker, and the state bankers associations can find an opportunity to serve their local agriculture. The problem of supplying farmers with adequate credit to move fertilizer from the manufacturer to the farm exists in every farm community. It is not an easy problem to solve. Many practices have grown up in the fertilizer industry's marketing which are frowned upon by bankers: No single answer is to be found for the many facets of the credit problem which

(*Continued on Page* 111)

● Farmers should be encouraged to reduce acreages and produce more from each acre at lower production costs.

● Country bankers have an important role in our agricultural economy, supplying farmers with credit to facilitate movement of fertilizer from the manufacturer to the farm.

SPRUCE BUD WORM SPRAY PROJECT

Insecticide storage tanks, pumps, meters and one of the spraying planes operated by Heckathorn and Johnson Airlines in the Santa Fe phase of the spray operation.

DURING the summer of 1955 a tremendous spray project for the control of the spruce budworm was successfully carried out in western United States, with some 450,000 acres being treated in three widely scattered areas of New Mexico, and an added 300,000 acres being sprayed in Montana. Involved in successful completion of the gigantic aerial spraying program were the building of local pesticide formulating plants, the construction of air strips, and the spraying of this tremendous area, much of which was at a very high elevation, with the job made even more difficult by such hazards as mountain peaks, deep canyons, etc.

The New Mexico spray operation was conducted under the supervision of James A. Egan, project director, New Mexico Spruce Budworm Project, Albuquerque, N. Mex. Spray operations in the state were conducted in three widely separated areas: in the Lincoln National Forest (headquarters — Alamogordo); the Santa Fe National Forest (headquarters—Santa Fe); and the Carson National Forest (headquarters—Taos). Total area sprayed in the state was 446,611 acres. Project records indicate that the spraying was accomplished at an average cost of $1.39 per acre.

DDT was the toxicant used, applied at the rate of one pound to the acre, in a fuel oil base. Good control of the infestation was reported to have been achieved on 93% of the area sprayed. In the successfully sprayed area budworm populations were reduced from 90 to 95%. In the 7% of the area where desired control was not accomplished, responsibility for the lack of control was credited

The air strip, planes and storage tanks at Cuba, N. Mex. All photos courtesy U. S. Forest Service.

Top and bottom: photos of the actual spraying operations. High elevation (7,000-11,500 feet) with many peaks and canyons made the operation hazardous, but the enire spraying project was completed without accident. Center: loading a Ford tri-motor plane.

to erratic insect development, resulting from abnormal weather conditions.

Spraying was conducted at high elevations (7,000-11,500 feet). The operation commenced on July 7 on the Lincoln National Forest, and was completed on July 8 on the Carson National Forest.

Two airfields were constructed and one lengthened to provide facilities near to the spray units. The spraying was done by a variety of heavy airplanes. One B-17, and one T.B.M. were used in addition to several Ford trimotor and B-18, DC-2 and DC-3 spray planes. Total spraying time was 376 hours and 44 minutes. An additional 331 hours and 1 minute was flown by light planes for orientation, observation and other purposes. The Forest Service is proud of the fact that there were no aerial accidents on the project.

Finished insecticide, transportation to the airfields and storage and plane loading facilities at the airfields were furnished under contract by Heckathorn and Company, Richmond, California. The facilities furnished and service rendered by the insecticide contractor were described by The Forest Service as "outstanding."

The Montana spray project was under the supervision of Clarence Sutliff, U. S. Forest Service, Missoula, Montana. Operations were conducted from Gardner, Montana, and Hamilton, Montana, and the total area covered was approximately 300,000 acres. Excellent control results were again reported.★★

New York State Insecticide & Fungicide Conference . . . Application Equipment Conference, held Nov. 8

MEETING together again this year in Ithaca, N. Y. at Bibbins Hall of the Cooperative GLF Exchange, November 8-10, the Seventeenth Annual New York State Insecticide and Fungicide Conference and the Eighth Annual Pesticide Application Equipment conference gave members of the pesticide industry and pesticide applicating equipment manufacturers an insight into the experimental work done in New York State during 1955. Recommendations of the extension service for 1956 were also presented.

Welcome to the group of more than 450 registrants was extended by Dr. Charles Palm and Dean W. I. Myers, N. Y. S. College of Agriculture. Noting the increasing research in the field of pesticidal chemicals, Dean Myer averred that if entomolgists were satisfied "soon we'll be needing a professor for every variety of insect!" In a more serious vein, he expressed optimism that chemical companies would continue their excellent studies and investigations, giving the agricultural industry the benefit of their work with new chemical compounds as soon as promising new products are developed.

Dr. W. A. Rawlins, in his paper "Insect Control on Onions and Carrots," reported that onion mites were considerably reduced by application of ethylene-dibromide at 10 gal. per acre. D-D mixtures were found to be ineffective at 40 gal. per acre. Soil fumigants were tried in these tests because insecticides had failed to give control. However, a decrease in yield was noted when using ethylene di-bromide (it is well known that bromine is bad for onions, according to Dr. Rawlins). Rust fly troubles with carrots were said to be controlled in the first generation by the use of aldrin; however, no control was obtained on the second generation. Broadcast treatment was believed to be the only way to control the second generation.

Long Island vegetable problems were discussed by Dr. M. Semel and colored slides illustrated the serious effects of the red spider mite on lima beans in that area. Good control was achieved with FW 293, AC 528, and Systox. Also, Cyanamid 12008 and 3911, new systemics, were thought to be worthy of continued trials next year. Parathion was not too effective when the mite population was high or when infestations were well started. It will, however, continue to be recommended. Found to be relatively ineffective were: chlorthion, toxaphene, OS 2046 and Dipterex. For control of the cabbage looper on cauliflower, Dr. Semel reported that the following materials were used with good results: endrin, isodrin, toxaphene, DDT (75 per cent wettable), parathion, and dieldrin. Dieldrin did not show up as well as in the previous year, he said. Poor results were obtained with Dipterex, DDD and malathion, and chlordane and heptachlor can be eliminated as ineffective, Dr. Semel continued. It is believed that the systemics probably represent the best control chemicals for cabbage aphids.

Dr. J. A. Adams, discussing the corn insect problems in the Hudson Valley, said that DDT is still the backbone of corn insect control in Ulster County; also, he somewhat facetiously asked the audience for a moment of silence to pay respect to the hardy and stubborn qualities of their enemy the corn earworm. In descending order of effectiveness for applying DDT to the corn crop, Dr. Adams listed: ground spraying, airplane spraying, ground dusting, and airplane dusting; however, airplane spraying is the most practical method of application in that area, he said.

Dr. R. R. Kriner, NYS College of Agriculture, advised field men to go out with the grower and observe actual application of their chemicals. "In general," he admonished, "it's only after the crops have been treated that the field men see the grower and hear the complaints of ineffectiveness." He presented the recommendations for Vegetable and Potato Insect Control for 1956 to the group.

Spergon SL and Agrimycin were said to be very promising for the control of the downy mildew of broccoli, according to a report from Dr. J. J. Natti, Geneva, N. Y. Some injury was reported from the use of Agrimycin.

Thiram was described as very effective, somewhat more so than Captan, as a pre-emergence treatment with insecticides on bean seed (for seed rot) by Dr. F. L. McEwen, Geneva, N. Y.

Dr. W. T. Schroder discussed tomato fungicides and distributed a two-page leaflet to the audience on the results of tests against early blight and anthracnose of tomato.

A notable change in the extension service's recommendations for tomato disease control was the elimination of Captan from last year's list.

Cheesecloth treated with heptachlor, malathion or dieldrin gave good control of thrips on roses when the material was placed acroes the ventilators of greenhouses, according to E. Karlin, Ithaca, N. Y. In tests recently completed on Long Island, 63 to 88 per cent effectiveness was reported.

In commercial trials against two-spot on roses, all the following materials tried were reported to be excellent: 293 (Rohm & Haas), 121, 131, and 141 (Chemagro).

The wooly aphid was controlled to a fair degree by parathion and ferbam combinations, according to tests reported by Dr. F. L. Gambrell, Geneva, N. Y. BHC or lindane was superior and is recommended under nursery conditions.

Equipment used for spraying turf, large areas and tree plantings was shown in colored slides by Dr. G. L. Mack, Geneva, N. Y.

Guest speaker of the morning, Dr. Rosmarie von Rumker, director of research, Chemagro Corp., advised the audience that basic fundamental knowledge is lagging seriously behind application research in the pesticide field; although this gap in knowledge

is the narrowest in the organic phosphates. She looked forward to the time when pesticides would be "tailor-made" for each individual application. The mechanism of action of organic phosphate pesticides was outlined by Dr. von Rumker.

Dr. R. H. Wellman, Carbide and Carbon Chemical Corp., guest speaker at the afternoon session, pointed to the responsibility of industry under the Miller amendment, and suggested that for the future industrial pesticidal research on crops of minor importance would, of necessity, be limited because of the expense involved in residue work. Citing a recent example of work done on mint rust research, he indicated that activities such as this might well have to be curtailed, because of the limited market and substantial expense now involved in test work.

Dr. J. M. Hamilton, Geneva, N. Y. found the zinc salt of a pyridine chemical group to give better control of peach brown rot than that obtained with the standard captan or sulfurs. One spray of this fungicide prepared by the Olin-Mathieson Corp. gave brown rot control equivalent to two sprays of the other materials.

The streptomycin materials, agrimycin, Phytomycin, and Merck STB, used at 100 ppm, gave appreciably better control of pear blossom blight than did Bordeaux mixture, however, more effective control is still necessary.

Dr. Hamilton reports that sulfur is still the outstanding material for control of apple mildew. In fact, it was suggested that the trend toward sulfur, which for a long period was losing much popularity in favor of the newer organic fungicides, may become stronger if the mildew problem persists. Carbide and Carbon's material #9116 has shown exceptional promise in mildew control tests. Captan, ferbam, and other standard organic fungicides have proved ineffective to date. Karathane is not very effective. One important point in mildew control is the application of the first two sprays in the spring within an interval of 5 or 6 days.

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N. J. Pesticide Dealers Hear 1956 Recommendations

MEETING at Rutgers University, Nov. 16, more than 145 pesticide dealers, county agents and extension service personnel discussed recommendations of the N. J. College of Agriculture for 1956 pest control. Drs. Leland G. Merril, Jr., and Spencer H. Davis, Jr. were co-chairmen of the conference; special guest was the State Chemist, Dr. Stacy B. Randle. Mr. Randle advised the group that enforcement of the Miller Bill will be noted in the coming months and they should expect products to be picked up for excess residues. Also, further congressional action is possible in the next session, which may add complications to an already complex situation, he added.

Dr. Donald Schallock, in his paper "1956 Weed Control Materials" emphasized the importance of temperature considerations when applying dinitro and pre- and post-emergence treatments. It has been found that activity of dinitro doubles when a rise in temperature of 10 degrees occurs, from the usual 60-70 degree range.

Diazinon was by far the best material tested in experiments for fly control, according to Dr. E. J. Hansens. With one percent wettable powder or emulsifiable solution, at least 12 weeks of fly control resulted. Half as much insecticide gave effective control for 7 to 12 weeks. American Cyanamid 4124 used at 0.5 percent or wettable powder or emulsifiable solution gave three to six weeks control, poorer results than were reported in 1954. Chlorthion gave about a month of fly control when used at 0.5 percent and seven weeks with twice that strength. Malathion tested as a wettable powder and an emulsifiable solution with sugar as presently recommended for fly control gave only two to four weeks control except where the fly population was low.

Dr. R. H. Daines reported that streptomycin seemed to be of value in bacterial control, however the cost still is quite high.

Systox and General Chemicals's 923 gave good control of mites at pink bud stage on peaches for the entire season, it was reported by Dr. B. F. Driggers, research specialist in entomology. Ryania, was effective for control of codling moth, giving as good control as DDT. The advantage is that ryania can be used up until harvest time and doesn't interfere with parasites of the mites.

Dr. Merrill advised that parathion is now being recommended for garden centipedes. Also, chlorinated hydrocarbon materials, not previously recommended for potatoes, are now considered satisfactory, particularly aldrin.

The work of the College on the new project of nematode investigation was reported by Dr. M. T. Hutchinson. Although no results could be given, since this was the first year of the study, more than 500 samples representing 29 crops have been investigated and 16 different types of nematodes have been found. Methods of soil fumigation were described. Compounds used in the study included Virginia-Carolina 113, ethyl dibromide, Vapam, DD and nemagon.

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Insecticidal Value of Allethrin

Allethrin was generally less effective initially than natural pyrethrins in comparative toxicity tests with several species of insects. The ratios of their potencies were: *Cimex*, 0.17; *Rhodnius*, 0.12; *Pediculus*, 0.24; *Xenopsylla*, 0.17; *Aedes*, 0.38; *Musca*, 0.72; and *Ornithodoros*, 0.13.

The median lethal concentrations of several persistent insecticides against fleas and lice has been reported as follows: against the oriental rat flea the toxicities were (in descending order of potency) gamma BHC, dieldrin, aldrin, chlordane, DDT, pyrethrins, allethrin, and toxaphene. Against lice, the order of toxicity was: dieldrin, gamma BHC, aldrin chlordane, pryethrins, allethrin, and DDT or toxaphene. R. C. Roark and R. H. Nelson, Entomology Research Branch, USDA, Oct., 1955.

SAFETY...

Problem Child of the Industry

By C. O. Barnard*
Executive Secretary
Western Agricultural
Chemicals Assoc.

SAFETY practices in manufacturing plants of the producers of basic agricultural chemicals, and in the processing plants of formulators of basic compounds into field use products, are not a problem. When personnel in the plant of a basic producer or a formulator of consequence now suffers injury, the incident almost certainly can be classified as a true accident caused by a failure of mechanical equipment. That is so because, from the start of volume production of highly toxic compounds, industry's industrial hygienists have refined and improved techniques designed to protect production personnel—and management has required strict adherence to precautionary rules.

It is the misfortune of manufacturers of potent pesticides that they can not control field uses of their products. Traditional marketing of pesticides throughout our agricultural economy requires basic producers to depend upon formulators, distributors and dealers to get their products into the hands of farmers and service applicators (ground and air) for end point uses.

Distributors and dealers cause their principals worries only in connection with the so-called "broken package" deal. Fires in two pesticide warehouses in the west have created a demand by some political entities for storage ordinances, but that problem is disassociated from the problems of use and post-use of pesticides, and W.A.C.A. proposes to cooperate with authorities and consult with N.A.C.A. and M.C.A. on that one.

In the use and post-use category of pesticides, farmers and their employees, and ground and air service operators, have created and are creating, problems which industry thinks should not, but which nevertheless are, being dropped into industry's lap. Those end use groups far too often ignore the instructions and recommendations for use and handling given on labels. For the record, I shall say that label information is accurate and explicit. It is the combined product of manufacturers of integrity, the agricultural experiment stations, and the federal and state regulatory agencies. Labels are designed for one purpose: the safety of agricultural personnel and the general public.

The end use groups quite universally disregard responsibility for safe, final disposal of "empty" metal containers; although they seem now to have accepted as standard practice the burning of paper containers—apparently because disposal of paper by fire is a simple, inexpensive procedure requiring little labor.

Metal containers of from one to fifty gallons capacity have become a frustrating problem of considerable magnitude to regulatory officials and to industry in California and in other areas of the west. There are thousands of five-gallon "empties" on dumps in each of several locations, and air strips everywhere are decorated with empties. Unfortunately, almost none of those containers are even virtually empty; and, even if they were, they would be potentially dangerous. In the eyes of the law, they are, I believe, "attractive nuisances." If pesticides "empties" will hold water, or if they would be useful if cut and flattened for the building of shacks, death or sickness could be the fate of those who might handle them.

Agricultural inspectors at one air strip drained the residual pesticide from ten one-gallon cans—and collected a full gallon of a very potent compound! In addition to the very great hazard of the residual pesticide, a ten per cent economic loss was involved. It would seem that so large a residual content in each can is inexcusable; but perhaps it was due in part to the fact that the design of certain containers, in order to make them sturdy, tends to preclude rapid draining. Such cans may be drained quickly only by punching a good-sized hole just under the upper periphery of a can. That requires a little time, and time is of the essence when an agricultural aircraft is in for loading. It also is a bother—and why bother?

Whatever the reasons for tailings in containers, adequate disposal of them is a baffling problem. So far as we in the west are concerned, industry and W.A.C.A. have recommended that all metal containers be punctured in several places, or crushed with heavy equipment, then buried. Implementation of that recommendation could be a hazardous operation, because a considerable volume of toxic materials would be squashed out of the containers. Such disposal procedure is not ideal, but we have been unable to devise a better one.

In an attempt to find a means of decontamination of empties to obviate the necessity for puncturing and crushing, I have sought to find a chemical, or chemicals, which would neutralize residual pesticides; but there seem to be no possibilities which would not create other hazards.

At any rate, puncturing, crushing and burying is not being widely practiced. Bulldozers are expensive to buy or to hire, labor is costly—and again there is the bother of it all.

*Presented October 15, 1955, at the convention of the Association of American Pesticide Control Officials, Inc., in Shoreham Hotel, Washington, D.C.

So containers with their lethal residues pile up; and public officials are asking themselves, and are asking industry, "what shall be done about the situation?"

Industry's reply is, in effect, that it has produced extremely useful products which agriculture had long needed and now demands. Those chemical compounds must be packaged, when in liquid form, in heavy plate containers, to assure safety in transportation, handling and storage. The economics of container production, transportation and spoilage preclude the return of such containers if they are of less than fifty gallons capacity.

Industry's further position is that, as with other liquid commodities, several sizes of containers must be utilized in order to have suitable distribution of products to all classes of agriculturists; and that, by accepted and long-established common practice in our agricultural economy, an empty container is the responsibility of the final purchaser.

It seems to me that industry's position is logical and tenable. Unfortunately, the problem remains.

In one western state, there occurred recently considerable frenzy over eight hospital cases in one week from pesticide poisoning. All of the victims were agricultural aircraft service personnel—pilots and loaders. The casual evidence obtained by all interested parties, official and non-official, showed clearly that each case was the result of careless handling, plus culpable indifference to the known hazards so far as personal hygiene was concerned. This is the old "familiarity breeds contempt" problem.

We also have the "broken package" problem. Dealers and others who well know that certain products should be dispensed only in original packages will sell pounds or pints or gallons of a corrosive or otherwise injurious material out of a large container, put it in any bag, bottle or can available—and ignore without a qualm the absence of the manufacturer's label. Those men have no sense of public responsibility and are stupidly indifferent to their own best interests.

There is no need further to state the case. The great need is a solution to those several related problems; and there seems to be no approach to a solution other than that which is loosely termed "education."

How *can* there be induced into the minds of buyers and applicators of hazardous pesticides an action-impelling willingness to follow literally the directions and cautions given on pesticides labels? Can enough people in end use occupations be sold that principle of operation to reduce greatly the incidence of use and post-use poisonings? Human nature being what it is, *can* consumers be induced to cooperate effectively for the safety of all without subjecting them to penalties for non-cooperation?

Individual manufacturers and others have tried to find satisfactory answers to those questions but none, so far as I know, can say that outstanding success has followed effort. W.A.C.A. printed and distributed this year many thousands of multi-language safety posters. We believe they were helpful, but there is no way of measuring so small an effort. Sustained impact, through constantly changing devices, may be required.

In view of the record, it obviously is futile to expect, or to assume, that the several problems will solve themselves. We do know, however, that persuasive pressure has many times changed mass attitudes. So I have been asking myself *these* questions:

Is it reasonable to believe that concerted, persuasive action by the trade organizations, the regulatory agencies and the universities—those interested in continued economic uses of modern pesticides—would be able to achieve the desired objective? Could such a cooperating group conceive, develop, organize and conduct such a project?

Probably no individual in the country possesses sufficient factual information, plus the vision, to compose at this time intelligent answers to those questions. Certainly I cannot do so. All I can say is that need for control of the situation is urgent.

I do not propose that an attempt be made now to formulate a campaign of the magnitude required. I do propose that the trade associations and the federal and state regulatory agencies give earnest consideration to organizing a committee representative of those organizations plus, if possible, qualified personnel from several colleges and universities, to explore the whole situation.

The objective of that committee would be to determine whether an effective safety campaign is feasible. I am a strong believer in the power of intelligent cooperative effort; and am confident that a mass pooling of ideas and work can solve the problem. The universities and the regulatory agencies could participate, of course, only in an advisory capacity. How industry might finance such a project need not now concern us; but I believe that the major producers of pesticides would support in every way a well-organized, timely campaign.

A successful effort could come into being only through the application of visual and far-horizons thinking. Research almost certainly will uncover from time to time additional chemical compounds which will be highly potent to warm-blooded animals but so beneficial to agriculture that they must be used. Action is required. Action calls for leadership. It seems to me that industry should be the leader.★★

Final disposal of "empty" metal containers, used in packaging insecticides, is a serious problem to users and packagers — causing increasing concern to regulatory officials.

Inter-Relations Between Basic and Applied Research in the Development of Modern Pesticides

By Rosmarie von Rumker
Chemagro Corporation,
New York, N. Y.

SCREENING and testing directed toward the development of new pesticides has in the past been carried on, in most cases, by methods based on the principle of trial and error. If considerations of time, expense, manpower and other factors essential to the development of a new pesticide are arbitrarily and temporarily disregarded, then this process may be viewed as a basically rather simple operation.

A chemist has a chemical—perhaps as a result of some systematic synthetic pesticide development work, or as a by-product of syntheses directed toward other projects, or maybe just because he happens to have cleaned out his shelves and drawers. Regardless of the source of acquisition, he has no way of knowing if this chemical will be biologically effective, and he is dependent upon appropriate biological tests for such information. It is evident that most of the currently known groups of pesticides were not discovered as a result of systematic research efforts started as a basic inception in the way a plant grows out of a seed, but that (with perhaps certain variations in the degree of maturity) the finished fruits dropped into the laps of those who had posted themselves underneath the right trees. This statement may not be completely applicable with respect to certain synthetic plant hormones, which were developed in a way somewhat different from that by which the organic insecticides and fungicides came into being; it is, however, beyond the scope of this paper to go into further details in this field. Nevertheless, it is applicable to practically all other modern pesticides, as illustrated by the fact that both DDT and benzene hexachloride were known and described as chemicals long before their insecticidal properties happened to be discovered.

Most pesticide development research facilities appear to be based on the tacit acceptance of this trial-and-error principle which, by continued use and routine, has become established as a standard procedure, providing the tracks on which the "pesticide development train" rattles along.

A somewhat more determined research effort may be recognized in the synthesis and development of analogs, homologs and compounds chemically related to materials already known to possess pesticidal activity, as exemplified by certain DDT analogs. This, however, must also be considered as an empirical approach, and it should be recognized and admitted that basic research and knowledge is lagging far behind the rapid advances made by applied research and its trial-and-error methods.

We in the insecticide industry, as well as others engaged in the development of new pesticides, seem to be approaching a point where we must ask ourselves whether this trial-and-error method is still adequate to cope with the problems facing us. The rapid development of resistance to different insecticides in various groups of insects and mites, or the disturbance of the natural balance in insect populations by indiscriminate use of insecticides might be mentioned as examples to demonstrate the justification of this question. The next question naturally is: What other possible approaches are there?

The organic phosphate insecticides may be taken as an example in considering certain trends that seem to indicate possible other approaches, and seem to lend support to the hope that it will be possible to "make insecticides to order" in the not too distant future, i.e. to compose molecules comprising optimal combinations of active groups necessary to make a chemical suitable for the accomplishment of required results, with a minimum of undesirable side effects.

The organic phosphates are chosen for this consideration because it is this chemical group that seems to be farthest advanced along the lines that may finally lead to "tailor-made" insecticides. This is due primarily to the fact that the mechanism of action of the organic phosphates in biological systems is much better known and un-

derstood than that of other chemicals used currently as pesticides. In other words, the gap between basic knowledge and understanding and applied research is much narrower in the organic phosphate field, than in any other group of presently known pesticides. (This fact appears to be well recognized by the pesticide industry—one authority in this field recently estimated that approximately 90% of the insecticide development research work undertaken by commercial interests is currently being devoted to organic phosphates.)

In the application of pesticides to agricultural crops, there are three main components to be considered: the pest, the plant, and the toxicant. As is well known, the organic phosphates are assumed to exert their effects on insects (as well as on mammals) principally by inhibiting the enzyme, cholinesterase. A vital function of cholinesterase in the organism is believed to be the destruction of acetylcholine, a process essential to life. This destruction is brought about by an inter-action of acetylcholine with the enzyme, which results in the decomposition of acetylcholine by hydrolysis and the simultaneous re-availability of the enzyme for hydrolysis of more acetylcholine molecules, so that relatively large amounts of acetylcholine can be hydrolyzed in short periods of time. Organic phosphates have certain structural similarities with acetylcholine, and therefore are believed to be attracted to the enzyme surface in much the same manner as acetylcholine. In fact, organic phosphates are also hydrolyzed by cholinesterase, just as is acetylcholine. The important difference between this process and the acetylcholine hydrolysis, however, lies in the fact that the phosphate-enzyme complex, unlike the acetylcholine-enzyme complex, is very stable, so that the enzyme is blocked, and is thus unavailable for its natural function. Figure 1 is an attempt to present the important factors in this process in schematic form.

An organic phosphate, in order to be able to inhibit the enzyme, must consequently be sufficiently unstable to be able to be hydrolyzed (or, in other words, decomposed) by the enzyme; otherwise inhibition of the enzyme cannot take place. On the other hand, it must be stable enough to be able to travel from the site of application to the site of action inside the organism (10). If these theoretical considerations are applied to a practical example, it follows that a phosphate must be able to penetrate into the body of the pest it is supposed to kill, either through the natural openings, the cuticle, or other parts of the intact body surface. Inside the body, it must be able to travel to those centers in the nervous system where the enzymatic process discussed in the preceding paragraphs normally takes place. The material will be deemed effective in controlling that particular pest if a sufficiently large fraction of it reaches these centers, inhibits the enzymatic processes occurring there, and results in the death of the pest.

Investigations of Metcalf and March (5) have indicated that distinct biochemical differences exist in the cholinesterases from brains of different insect and mammalian species. In studies involving a series of organic phosphates, these authors have shown significant differences in the amounts of chemical necessary to effect 50% inhibition of cholinesterase from brains of three different animal species. These relative differences were generally correlated with differences in the acute toxicity of these compounds to the animals studied. In other words, the phosphates that were investigated were more toxic to some species than to others, and these differences in toxicity in vivo, i.e. in the animal, could be correlated with differences in cholinesterase inhibition activity in vitro, i.e. in the test tube.

More recent studies by Fukuto et al (2) have provided valuable additional information along these lines. They investigated the effects of certain substituents to the phenyl ring in a parathion-type molecule and were able to show definite relationships between stability to hydrolysis in vitro and effectiveness in vivo.

Other very interesting investigations in a similar direction were undertaken by Ivy et al (3). These authors studied the effectiveness of nine pairs of ethyl and methyl homologs of organic phosphates against the boll weevil, the cotton aphid, the desert spider mite, and the cotton leafworm. They demonstrated that, with one exception, the methyl homologs were consistently more effective against the boll weevil, whereas the corresponding ethyl compounds were generally more effective against the cotton aphid, the desert spider mite and the cotton leafworm.

In 1950, Metcalf and March (5) predicted that a detailed knowledge of the properties of various cholinesterases and a correlation of the structure of various organic phosphate cholinesterase inhibitors with their specific action might result in the development of insecticides with a greater margin of safety to mammals, which might in turn enable entomologists to select compounds toxic to certain pests, but relatively harmless to bene-

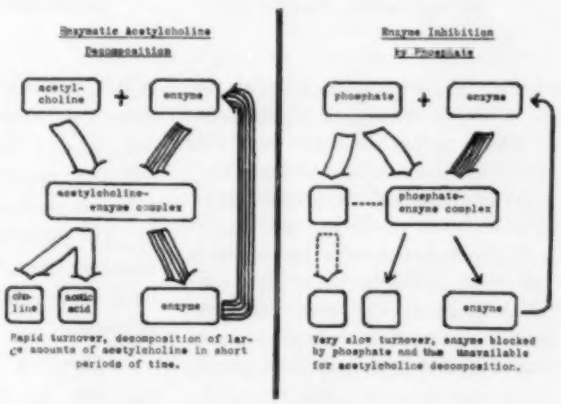


Figure 1

ficial species. It is both encouraging and gratifying that definite progress in this direction has been made since that time.

If the plant is introduced as the third factor at this point, the situation is still fairly simple as long as considerations are limited to the application of a non-systemic phosphate. In this instance, if the process is stripped of all complicating and interfering factors, such as inter-action of the insecticide with plant excreta, local absorption of the insecticide into plant tissues, influences of special microclimatic conditions existing in the immediate vicinity of plant surfaces, etc., the leaf surface may be considered just as the stage on which the intoxication of the pest by the pesticide takes place.

The picture becomes somewhat more complicated, however, if systemic insecticides are considered which are absorbed into the plant tissues and translocated inside the plant. These chemicals enter into a much closer relationship with the plant, and in order to better understand their mode of action, it is necessary to establish certain relations to plant physiology.

A plant may be seen as a basically very ingenious as well as simple chemical factory—if, for the moment, complicating factors are disregarded. Water and nutrients are absorbed through the roots and transported upwards in the vascular system through the stem to the leaves where photosynthesis takes place. This is the synthesis of organic compounds in which carbon dioxide—that the plant takes from the surrounding air—plays an important part, with sunlight acting as the source of energy. It is also referred to as assimilation. The resulting organic materials, also called assimilates, are then removed from the green leaves where they are produced and transported to places where new growth is being formed, or to places of deposit such as roots, fruits or seeds, depending upon the type of plant involved. The vascular bundles, in which the upward transportation of water and nutrients takes place, are called xylem; those in which the transportation of the assimilates occurs are called phloem. These vascular bundles may be compared to two pipeline systems installed parallel to one another, with the exception that the contents of the two systems do not flow in the same, but usually in opposite directions. Also, their contents are not identical, but are entirely different chemical media, which may be visualized by imagining that one of the pipeline systems contains water and the other another type of solvent. It is emphasized, however, that this comparison is an extremely crude one,—one that will have to be taken not only with a grain, but with a whole pound of salt.

Systemic insecticides can be applied to plants in several different ways, of which application to the foliage and treatment as a soil drench are the most common. Taking a widely used systemic, Systox* (9), as an example, it is known from very extensive research work conducted in this country, in Europe, and elsewhere, that its translocation occurs much more readily in the xylem than in the phloem. This is a rather important observation, because it explains a number of factors involved in its systemic action. For instance, Systox will control insects and mites on foliage if applied to the soil or as a seed treatment, but it will not control root aphids or other soil pests when applied to the foliage. It also explains why translocation from lower levels to upper ones takes place much more readily than vice versa.

An approach to "making insecticides to order" supported by a careful analysis of the mode of action of systemic insecticides . . . particularly Systox.

There is an important finding that has been established repeatedly for citrus as well as for some fruits, namely, the fact that toxic residues found in the leaves at a given time after application of Systox are usually many times higher than those found in the fruits (7, 8, 11). Factors responsible for this include the following: (a) The relative surface of fruits in relation to their weight is much smaller than that of leaves, so that proportionately smaller quantities of insecticide per unit of fruit weight are initially deposited on and absorbed into fruits; (b) In addition, the surfaces of fruits like apples, pears, citrus and others are quite smooth, so that they are physically much less capable of retaining spray droplets than are the leaves which often have tiny hairs (this applies only when full coverage sprays are used); (c) Commercial applications are often made at a time when the leaves have already reached their full size, while the fruits are still in rapid growth, which results in a consequent decrease in concentration of the toxicant in the fruit; (d) The relative rate of transpiration of leaves is higher than that of fruits and, if this is correlated with the fact that Systox is translocated primarily in the xylem, the water transportation system, it follows that the material is translocated into leaves more readily than into fruits.

Another interesting observation relates to residue analyses of Systox treated cabbage, broccoli and Brussels Sprouts. It was found that the outer wrap leaves consistently contain practically all of the residues found, whereas the head or center sprouts beneath the wrap leaves contain practically no residues at all, even shortly after application. In the case of a cabbage-type plant, the rate of metabolism, and especially the rate of transpiration, is considerably higher in the outer leaves than in all other leaf layers. The upward movement therefore prevails in the vascular system of the outer leaves, and consequently, little of the toxicant deposited by foliage application has the opportunity of downward translocation, which is a

(Continued on Page 103)

*Trademark, Chemagro Corp., N. Y.

THE GROWING Plant Food Market

By R. W. Scanlon
Phillips Petroleum Company,
Bartlesville, Oklahoma

THE marriage of the farming industry to the fertilizer industry has been a happy and profitable union over the years. It has brought forth the production of new plant facilities located to serve the farmers as well as bumper crop yields of all major crops. Like all arrangements of this sort, the road has its problems as well as its joys, and judging from current reports we may now be entering the problem stage.

Regardless of the information source, all signs point to an increase in the national supply of the primary plant foods, nitrogen, phosphates, and potash. The United States Department of Agriculture estimates that next year's supply of nitrogen available for use by farmers will approach 2⅓ million tons, which will be about 4.4% increase over 1954-'55. The estimate for phosphate supplies is forecast at 2.3 million tons—the same as for 1954-'55. In the case of potash, 1.94 million tons is forecast, which represents a year's increase of 4.3%.

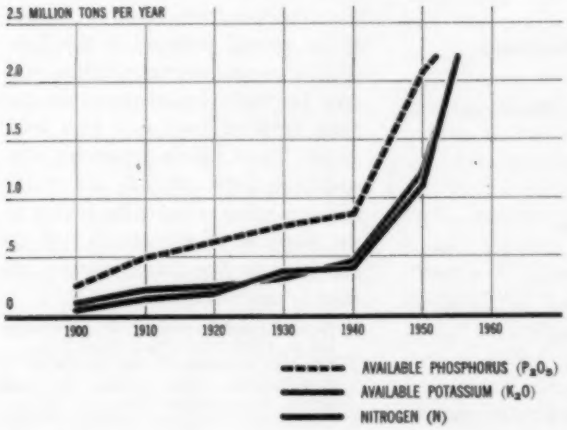
One of the present headaches common to farmers, the politicos, and to the fertilizer industry is the ever increasing crop surpluses of corn, wheat, cotton and many other farm commodities. Corn, wheat and cotton are the big users of plant foods. Therefore, in the face of mounting crop surpluses, coupled with a steady declining price for farm commodities the question is, will the plant food market still grow? Very possibly, only a soothsayer with a crystal ball can answer the question accurately.

There are, however, a number of agronomic and economic facts centered around sound soil management that will have a bearing on the problem, and may well provide the answer.

In order to support the fertilizer industry in an expanding manner, it is necessary that the farmer continue as a reliable customer for the currently available goods, and find reason to absorb the ever increasing plant food supplies. Whatever else we may call a successful farmer, he is, above all, a businessman. Oftentimes, his capital investment far exceeds that of his supplier of farm chemicals and other tools of his trade. The farmer, therefore, must make a profit to justify his investment, if he stays in business. And to make a profit under present conditions, he must have a broad knowledge of many subjects, not the least of which include the economics as well as the agronomics of plant food use. In our quest for greater production during the war years, new agricultural areas have been opened up to intensive cropping. In some cases, through the magic of farm chemicals, heavy earth moving equipment and water management, the new areas are within themselves reasonably self sustaining. In other instances, intensive farming practices moved in behind unusually favorable climatic cycles and now with more normal climate moving in, the uninitiated individual cannot comprehend why, for instance, general fertilizer usage tends to lag.

It is then we begin to realize that there are many factors of importance in the production of a given crop—critical temperatures at the pollination or grain filling stage, failure of subsoil moisture supplies at critical growth stages, inadequate available plant food at the period of greatest plant demand, and badly conditioned soil interfering with soil moisture, plant food and plant food movement. These and other conditions must be weighed. One great school of thought relies on legumes as the main source of supplemental nitrogen for extra crop production. The importance of

U. S. CONSUMPTION - PLANT FOODS



U.S.D.A. estimates for 1956 indicate that nitrogen available for use by farmers will approach 2⅓ million tons; phosphate supplies will be 2.3 million tons; and potash supplies are expected to be about 1.94 million tons.

legumes in livestock feeding and in soil conditioning is not to be questioned. However, their ability to deliver adequate nitrogen for sustained crop production can be questioned.

For illustration — on Sanborn Field[2] at the Missouri Agricultural Experiment Station, where legumes and grasses have been included in crop rotations for sixty-five years without soil treatment, the soil now contains less phosphorous, potassium, calcium and magnesium than when corn or wheat have been grown continuously. Far more farms are operated in this manner than by modern methods. At the Illinois Agricultural Experiment Station[3], legumes in the standard corn belt rotation increased the nitrogen level only twenty-three pounds per acre per year on the dark soils, and less than ten pounds of nitrogen per acre per year on the lighter soils, an average of less than $2.00 worth of nitrogen per acre per year — not nearly enough to meet the modern production demands on our farms. Moreover, the frequent legume seeding failures, the discovery that some legumes such as soybeans are soil depleting rather than soil improving, and the heavy demand of legumes for soil minerals have placed a new light on their place in soil management systems. In the drier areas of the small grain belt, the heavy demand of legumes for residual soil moisture often proves to be the undoing of subsequent grain crops due to moisture failure. Even in the more humid areas of the south where nematodes are a factor, legume production often becomes a difficult problem. Too often, legumes are given too heavy a load to carry.

Under the above management practice, it was not possible to keep pace with the plant food pressures placed on our soils. The plant breeder developed higher yielding strains, the farm machinery industry simplified the labor involved in producing a crop, new chemicals were created to sustain plant population, and the farmer found himself holding the bag. The fertilizer industry hopes that in the bag will be the plant food required to sustain high production.

The fact that farmers are in a cost-price pinch is known to almost everyone, particularly the farmer himself. One of the most profitable practices from the standpoint of improving the position of the farmer is to use fertilizers at rates designed to obtain high yields. In the absence of this practice, many farmers are finding their production efficiency at a point where farming by 1920 methods is becoming an unprofitable venture. Some interesting studies on the subject are reported by Dr. George Smith of the Soils Department of the University of Missouri. In a four year rotation of corn, soybeans, wheat and mixed hay, the respective dollar returns at three levels of fertilization were determined. The fixed cost of production was based on average figures from actual farm cost studies. The returns shown in Table I with corn calculated at $1.40 per bushel and other crops in proportion. showed a net profit of $26.55 for the four crops (four acres—1 acre each crop) for the low level of fertilization. At the medium fertilization rate, the return was $45.30, but where fertilizer applications were applied according to soil test, the return from four acres was $126.65.

The studies also showed that adequate fertilization materially cut the cost of corn production. In the case of no fertilizer use, the production cost per bushel was $0.84. Where $4.50 was spent for fertilizers, the production cost dropped to $0.76 per bushel, and where the soil was fertilized according to soil test, at a cost of $14.90 per acre the production cost per bushel dropped to a low of $0.58 per bushel. This may explain why corn is the biggest single crop user of plant foods — yet even in the heart of the corn belt area visual evidence of multiple plant food deficiencies is still commonplace.

Of particular interest to the farmer is the fact that on the four year rotation, when the calculations are based on corn at $1.00 per bushel, soybeans at $1.75, wheat at $1.40 and hay at $15.00 per ton, the low rate rotation showed a loss of $8.20 for the four years.

It, therefore, does not require a crystal ball to deduce that the farmer who pays $0.26 more per bushel to produce his corn will be at a disadvantage over his neighbor, who produces corn at $0.58 per bushel. Furthermore, it is increasingly clear that the farmer who continues to produce crops at a loss will have to seek other employment. The farmer who conducts his operations in a business-like manner and weighs the advantages of the several practices in the light of their monetary returns to him, will give favorable consideration to the place of plant food at a high level of use. The fertilizer distributor who understands the principle and makes a sincere effort to bring the subject to the attention of the farmer will do him a great favor, and increase his sales in the bargain.★★

TABLE I

Financial Returns from Fertilizer Applications Under Relatively Favorable Price-Cost Ratio

(Cost and Yields for 4 acres—one acre each of Corn, Soybeans, Wheat and Hay.)

Fertilizer Applied	Cost Fertilizer	Total Production and Harvesting Cost	Yield in Dollars	Net Profit
Low rate	$ 4.50	$112.70	$139.25	$ 26.55
Increased rate	10.50	121.70	167.00	45.30
Soil test guided	39.60	164.35	291.00	126.65

Corn $1.40, soybeans $2.25, wheat $1.75 per bushel, hay $20.00 per ton.

1. News Report Volume 1 #13. September 9, 1955. Nat. Plant Food Inst.
2. Circular Research Points the Way. Fertilizing to Affect Decline In Farm Prices. University of Missouri 1954.
3. University of Illinois Bulletin #539.

Black Turpentine beetle, and Ips beetle among

Forest Pests Controlled by Sprays

A GROWING market for agricultural insecticides, and a market that shows even greater promise for the future, is in the control of forest insects and protection of our tremendous national timber assets. In an address to members of the National Agricultural Chemicals Association last spring, Hon. True D. Morse, under secretary of agriculture, observed that "timber-killing insects are a worse foe than fire." Happily however they can be controlled effectively and economically by insecticides.

An idea of the volume of pesticides that can find a market in forest insect control, and the tremendous acreages involved, can be gained from reports on the spruce budworm spray projects which were conducted this summer in New Mexico and Montana. (See pgs. 34-35).

Another section of this market for forest pest insecticides is currently being developed in the south Georgia and north Florida area by a group of pesticide formulators, including Triangle Chemical Co., Macon, Ga., who within the past year or two report increased sales and a growing demand for pine beetle sprays for control of the black turpentine beetle and the Ips beetle. Active ingredient used in the beetle spray is benzene hexachloride applied at a concentration of 1% gamma isomer in solution of diesel oil. It is normally prepared as an oil concentrate containing one pound of gamma isomer per gallon of concentrate. The following ingredients are listed for the Triangle Chemical Co. product:

Active ingredients	
benzene hexachloride gamma isomer	12.25%
benzene hexachloride other isomers	18.25%
petroleum hydrocarbons	64.50%
Inert ingredients	5.00%

This concentrate is of course diluted for use, mixing one part of the concentrate with 14 parts of water or fuel oil. Fuel oil is more effective as the diluent, but since it may damage lawns, water must be substituted as the diluent where this consideration would be a factor. A gallon of the concentrate is normally adequate to treat 80 average sized trees.

The black turpentine beetle (*Dendroctonus terebrans*) has caused heavy losses in this Georgia-Florida area over the past five years. First attacks, according to research bulletin #76 of the Southeastern Forest Experiment Station, Asheville, N. C., are almost always made within the basal 18 inches of the tree. "The light attacks, the beetle's long life history and its relative inactivity make it much easier to control than other bark beetles."

Newly attacked trees may be saved by spraying, particularly if treatment is applied in the early stages when the attack is light and only a small number of trees is affected. The insecticide kills the insects in the tree, as well as those which try to enter subsequently, and since this beetle continues to fly into the area to reattack, control tends to be very effective, the bulletin continues.

It is suggested that, in spraying, a cone-shaped spray of small droplets is desirable, rather than a misty, fog-like spray. Medium air pressure is suggested to force the spray into cracks and crevices of the bark. The spray is applied to the basal 18 inches, or higher if indicated. Two sprayings are suggested, with the second being directed at the ground line. It is noted that repeat applications may be required through summer and fall.

R. H. Smith, entomologist, Lake City, Fla., who prepared this bulletin describes this particular spray procedure as effective only against the black turpentine beetle, as its attacks are made at the base of the tree. A different approach is suggested if the purpose is to control the Ips engraver beetle or the southern pine beetle, both of which attack the full length of the tree.

As a matter of fact opinion varies in the area as to best method of control, with some local forestry branches holding to the opinion that tree trunks should be sprayed as high as possible even for control of the black turpentine beetle. Also a lower concentration of spray is suggested for the Ips beetle.

Another bulletin (#81) of the Southeastern Forest Experiment Station, prepared by R. J. Kowal, division of insect research, gives specific recommendations for control of the Ips beetle. During the very dry years of 1954 and 1955, the bulletin reports, Ips engraver beetles have increased sharply in numbers, and severe outbreaks have been reported in central North Carolina, South Carolina and southern Georgia. An aerial survey in south Georgia in January, 1955, disclosed 65,000 cords of standing timber killed in this area.

The Ips beetle attacks the tree at any point, and hundreds of beetles attack at the same time. Weak trees are first targets, and abnormally dry weather causes drought damage, inviting insect attack.

The same type insecticide is used for control of this beetle, but as indicated above a lower concentration is suggested for Ips. Also, for Ips beetle, drenching the entire trunk of the tree is definitely indicated. Bulletin #81 suggests adding one gallon of BHC to 55 gallons of light fuel oil, but the recommendation in Georgia is reported to be for a much higher concentration, with one gallon of BHC to only 30 gallons of fuel oil.

(*Continued on Page* 114)

WENATCHEE, Washington was the site of the 7th Annual Washington Aerial Dusting and Spraying Conference, where some 150 agricultural aircraft operators, pilots, field men and equipment manufacturers' representatives, pesticide formulators and state and federal researchers met. Topics discussed in the two-day session included remarks by members of the Washington State Department of Agriculture, progress reports on research on use of aircraft for pest control, safety in aerial application and use of aircraft for forest insect control projects, through suggestions for the use of aircraft for control of insects and diseases of field and orchard crops.

John H. Vaughan, C A A, Spokane, tests weed knowledge of Bob Allison, Star Parks Aviation, while Joe Scaman, Economy Pest Control, Yakima, looks on.

Alex Berkes, Crop Duster Airways, Yakima; Robert A. Young, Flyrite Air Service and D. F. Koponen, Economy Pest Control, Yakima. At right is Dr. Wm. Upholt, USPHS, Toxicology Lab, Yakima presenting certificates to these three of the 9 pilots who took part in TEPP experiment.

Operator Attitudes

"THE economic aspects of the air application business are the most important problems needing a solution," stated Glen M. Chambers, Washington State Aviation Association. "The package deal has made selling easier for operators, but has raised overhead. Operators have been forced into the practice by competition in certain areas, but such practices result in high credit risks, and everybody seems to gain but the applicator," he observed. The results of a questionnaire on cost of operations in '55 as compared with '51 indicated that costs were up 22%, epuipment parts up 28%, and pilot salaries up 21%. Profits were down, according to 70% of the replies, while 30% reported an increase in profits. Farmers are more 'cost conscious,' and are inclined to wait till their needs are more acute before taking action, and with high farm costs the farmer wants more service for his dollar.

"How can operators improve their economic condition?" "Cutting operating costs is one way . . . , and smaller operators having a low overhead may be the ones to survive. Certainly there is a definite need to educate the farmer to an understanding of industry problems, so he realizes that when the operator makes a fair profit, he as a customer will get the most for his dollar. The air application industry needs educating too, so that all understand the 'cost of slashing prices.' A formula for the price slashing reaction could be expressed as—volume x turnover x small margin equals disastrous results," Chambers concluded.

WSC Economist, Jay Swanson found a wide variation in charges made by air applicators for performing the same service. "Low prices make the farmer skeptical—he knows he may not get the same job from the low-priced operator, and chances are he is right—but it still makes him wonder" Swanson stated. "Farmers distrust the 'package job' and distrust results." He suggested that operators leave the sale of pesticides to the boys in that business and that the air applicator take responsibility for air application only. "This industry is probably not serving one-third of the potential volume in the state," he observed, "and a good share of farmers are still skeptical of air application." Farmers are not "sold" on the essential nature of timing in herbicide and other pesticide applications. He noted that Extension and research people should put out more data to producers on proper pesticide usage.

Ground Applicators

"WASHINGTON Ground Sprayers have had growing pains," L. George Mock, Jr., president, Washington Association of Ground Sprayers, Inc., stated. The association was formed because of a need to clarify existing laws, and to present the operators case to interested regulatory officials. Operators also found a need for the exchange of ideas on control recommendations for pesticides, and the use of liquid fertilizers and soil sterilants. "The group," he advised, "is eager to learn, but needs proper and adequate public relations. The membership is apparently quite well versed in most phases of their work, and primarily interested in doing a good job," he concluded.

Herbicides

"THE objective in using 2,4-D is to kill weeds, and timing of applications is the most critical factor in this operation," Dr. Lowell Rasmussen, WSC Agronomist told his listeners in a review of herbicides. ""In the Polouse country during the past two years, most of the failures of herbicides . . . particulary 2,4-D could be traced to faulty timing. 2,4-D is beneficial to crops only when it removes weed competition—it does not stimulate the crop.

"While certain cereal crops are relatively resistant to 2,4-D, one can, and often does, get severe injury at certain growth stages. Susceptible periods for cereals are: 1) seedlings with one to two leaves, prior to appearance of tillers, 2) after second node of stems appear, and 3) bloom stage, when flowers are about to be pollinated. The amount of injury—if spray is applied during a suscept-

Washington Aerial Dusting-Spraying Conference

A Special Report for Agricultural Chemicals

By Charles H. Starker

ible stage, is influenced by the chemical and carrier used. Where a crop is sprayed at a critical time, a twisting and bending action is produced, but injury is usually not as bad as it first seems. Yield reduction will depend upon amount of moisture and favorable temperatures following application.

"Cereals are most resistant when well tillered, with numbers of short stems at the base of the plant. If temperatures are favorable, this is the optimum time for application. The next best time is after bloom and on up to harvest—but by this time annual weeds are usually too far along; in any case, some action will be found on perennial weeds. Where weed problems are severe, the grower may have to compromise with crop stage and possible injury to reduce populations of perennial weeds the following year. Growth regulators are slow-acting and need several days to take effect. During this time, environmental factors have a considerable influence on quantity of chemical entering the plant system. Cold weather lessens rate of kill and temperature affects plant metabolism, respiration, rate of growth, absorption of chemical and translocation. The temperature factor before and after application is more critical than at date of application. Rain has the most adverse effect on amine formulations, and not such a pronounced action on ester and oil or ester and water mixes. Even so, 12 to 24 hours of dry weather are best for amine applications if satisfactory results are to be achieved.

"Rates of chemical used must be adjusted to stage of weed as well as crop growth. Rates that would be satisfactory when weeds are small may not be effective when weeds and crop are both larger. Best spray coverage is secured when the crop is six to seven inches high," Rasmussen concluded.

"Predicting weather and weed problems is difficult, and it is often necessary to call on growers several times before jobs can be lined up," Wally Bowen of B & B Flying Service, Wenatchee, remarked in his talk to WACA members. Operations in new areas are carried out in close liaison with county agents and others, after which the applicator still has to sell the grower on the importance of timing applications. As the grower is paying for the job, his ideas have to be taken into consideration . . . if they are too far out of line, the job is turned down. Quite frequently the grower wants the operator to guarantee a job, or kill — obviously this is impossible. Flagmen are used at all times in their operation, and where possible the grower is present when the application is made," Bowen concluded.

"1955 was the first year the State Department of Agriculture could put their finger on sources of herbicide damage. The past year was fairly good as far as such difficulties were concerned," Auburn Norris, supervisor, Weed Branch, State Department of Agriculture, Yakima, said. Rather severe injury was found in one small area, and to a lesser extent in one other location. Carelessness of the applicator or disregard of regulations caused these difficulties, but they feel they're way ahead of last year. A growth regulator type of injury was found on peaches near Wenatchee again this year, but they haven't been able to nail down the exact time this injury occurs; it could be caused by 2,4-D, 2,4,5-T, MCP or 2,4,5-TP. Grapes in the Horse Heaven area had a negligible amount of damage this year. Use of low volumes of oil and 2,4-D on wheat has resulted in some streaking under certain weather conditions. Some of this injury could be avoided if operators would fly at a lower altitude and take a shorter swath, but this would cost the grower more money," Norris said.

"Air application of herbicides in north-western Washington has a good future, said Dwight Peabody, agronomist, North-West Experiment Station, Mt. Vernon. Many of the overwintering crops in this area are grown so that ground equipment can't be used. Dinitro amine, dinitro general and chloro IPC were applied experimentally by air to peas and sweet corn. Both dinitro amine and dinitro general performed well at rates of 3 and 10 gallons of total solution per acre. Because certain weeds are resistant to chloro IPC, its use is not suggested for these crops. Tentative recommendations for the use of dinitro amine on peas and sweet corn

were made this past year, and some 800 or 900 acres were sprayed by air in Skagit county this season, . . . the suggested rate being 4 quarts of dinitro amine in at least 5 gallons of water per acre—as corn or peas emerge. Moist soil is necessary to prevent loss of chemical by vaporization, or from blowing out of the field on dust particles.

Bulb crops lend themselves readily to the air application of herbicides. Dinitro amine is suggested at 6 quarts in 5 gallons of water per acre, and applied after the crop is planted in the fall. This will get all overwintering broad-leaved weeds. If annual blue grass is a problem, the addition of 1 gallon of chloro IPC is suggested.

Strawberries present a tough weed problem, due to the perennial nature of the crop, with winter annuals the worst weed pests. Dinitro amine is recommended for broad-leaved weed control, and IPC alone, or in combination with dinitro for grass. During the past two seasons, air applications of these herbicides have been made to rather extensive acreages in north-western Washington. No oil is used in strawberry weed control applications, Peabody concluded.

Fungicide Applications

"LACK of uniform infections of plant diseases makes the plant pathologists' job tougher in desert locations," Dr. Roderick Sprague, plant pathologist, Tree Fruit Experiment Station, Wenatchee, told the gathering. "Powdery mildew can be depended upon with a fair degree of regularity, but blight and scab are intermittent, and they have to depend largely on other areas for their control recommendations; . . . they do, however, have rather complete data on plant phytotoxity from fungicide materials.

"Antibiotics look very good against fireblight from an experimental standpoint. Such materials as Merck's STP dust are bringing the cost of this type of material closer to that of conventional fungicides. The Miller Bill is a tough one on the pathologists' recommendations, as fungicides often must be applied to crops quite close to harvest time. Ziram, for example, is effective on bull's eye rot and should be applied close to harvest, but now recommendations must be set so that applications are made no later than 21 days before harvest. 12½% Ziram dust will not give complete control, due to continual infection. Applications in May and again in September or late August are permissible, and as Captan's tolerance is 20 ppm, its use can be crowded closer to harvest.

The use of fungicidal dusts on soft fruits could have a big future on such things as "bread mould" types of infection, but more data is needed," Sprague continued. Karathane and Sulfur are both effective on pea mildew, but must be applied when the infection first appears. Karathane as a 3% dust has given satisfactory results.

Bordeaux is the most effective material for Coryneum blight control on peaches, but it would be a little difficult for a plane to apply a 6-6-50 Bordeaux. Maneb, Phygon and Captan all look promising for the control of this disease. Fall dusting by plane for scab control is a possibility, and 3% Phygon dust at 50 lbs. per acre would be effective and cheaper than lime-sulfur in areas of the Northwest. Applications could be made in the pre-pink, and pink stages, with Captan suggested for the calyx application.

Snow mould on wheat is one they're still watching, although there was little infection this past season. Ceresan 2X as a wet spray or with pelleted fertilizer is suggested. Yield increases of 10-15% have been obtained where Ceresan 2X and Nu-Green were used in combination. Where fertilizer was used alone, the crop held its own, with no decrease or increase in yield. The dust-type of Ceresan used for seed treating should not be used, Sprague concluded.

Tree Fruit Insecticides

"DDT and Parathion are still our two best insecticides for tree fruits, E. W. Anthon, entomologist, Tree Fruit Experiment Station, Wenatchee, remarked. A combination of 4% Aramite and 1% TEPP as a dust has given good control of mites on cherries, but no tolerance has been requested for Aramite on cherries under provisions of the Miller Bill. Chlorobenzilate looks good on resistant green house two-spotted mites, and excellent on peach silver mite, clover and red mites. Diazinon in mid-April was good on San Jose Scale, cherry aphis and green peach aphis. Cat-facing, caused by lygus and stink bugs can be controlled by air applications of 20% DDT and 2% Parathion dust at 40 lbs. per acre at pre-pink and shuck stages.

American Cyanamids' 12009, 3911, Shells' 06246, R 1303 and Rohm & Haas FW 293 are some of the "new" materials used in preliminary tests. Costs for developing new pesticides are increasing, and a firm place in control practices with an established future market is needed in order to justify their development by the chemical industry, Mr. Anthon concluded.

Legume and Potato Insects

LYGUS bugs are the number one pest on legume seed crops, Dr. E. C. Klostermeyer, entomologist, Irrigation Experiment Station, Prosser, Wn., stated. They suck sap from tender plant parts and kill or severely stunt and disocolor buds. Little or no seed is produced from such injured plants. Control is readily accomplished with applications of DDT, Toxaphene or Dieldrin. Chalcid flies are next in order of importance, reducing seed yields from 5-10% or more in some areas. As yet no chemical control is available for this pest. On alfalfa, the red-backed cutworm has been a problem, but may be controlled with applications of toxaphene, Mr. Klostermeyer said.

Fertilizer Facts

M. H. REISENAUR, associate soil scientist, WSC, illustrated a portion of his talk with slides, showing how legumes in eastern Washington need sulfur. Sulfur deficiencies have also appeared in fall wheat sown in re-cropped areas, he said. Airplanes could be used to apply the small amounts of water-soluble boron compounds needed to correct "yellow-top" in alfalfa, a condition

(*Continued on Page* 101)

Middle West Soil Improvement Committee Elects W. M. Newman President for 1955-56 at Annual Meeting in Chicago, Oct. 27

Middle West Soil Improvement Committee directors, standing, K. W. Wagenseller, Swift & Co.; D. A. Williams, Minnesota Farm Bureau; C. R. Sparks, Buhner Fertilizer Co.; E. T. Potterton, International Min. & Chem. Corp.; and A. R. Mullin, Indiana Farm Bureau Coop. Ass'n. Seated: Z. H. Beers, executive secretary; R. E. Bennett, Farm Fertilizers, Inc.; W. M. Newman, Price Chemical Co.; H. E. Wood, The Farmers Fertilizer Co. and R. A. Weis, Virginia-Carolina Chemical Co. (Not shown, L. E. Quiram, Illinois Farm Supply; J. D. Stewart, Federal Chemical Co. and George Kingsbury, Kingsbury & Co.)

By H. H. Slawson

THE Middle West Soil Improvement Committee is planning a concentrated drive in 1956 to help farmers see for themselves what fertilizer can do for them. Explaining the project at the committee's annual member business meeting in Chicago, Oct. 27, Z. H. Beers, executive secretary, said that while a lot of talk is heard about the benefits of fertilizer in bringing better living to farmers, a surprisingly large number of farmers still don't know anything specific about it. They don't know how to use it and how it will improve their personal welfare.

The plan is, he said, to bring the story to farmers through "see-for-yourself" demonstrations on individual farms in a given community. Farmers not yet using fertilizer would learn its value to them and those already familiar through prior use could be shown the need for adequate applications.

Details of this on-the-farm educational program are still to be worked out, Mr. Beers said, and there will be need for close cooperation on the part of the committee's member companies.

The Middle West Soil Improvement Committee is sparking a tremendous educational program of benefit to the fertilizer industry as well as the farmers, Mr. Beers revealed in his detailed report of the past year's activities. Informational material is flowing on a regular schedule to 600 daily newspapers, and another 1100 weekly newspapers in the committee's 13-state area. Some 280 radio stations also get suitable material, and other releases go to the trade magazines, to external house organs of manufacturer members, to the county agents, the colleges, fertilizer dealers, advertising agencies and others.

(*Continued on Page 95*)

(1) H. R. Lathrope, Nitrogen Div. of Allied Chemical & Dye Corp. and H. H. Tucker, Standard Oil of Ohio, Lima, O.

(2) K. A. Keith, Spencer Chem. Co., Madison, Wis.; Mrs. Grace Koos Anderson, E. H. Carbon, N. S. Koos & Son, Kenosha, Wis. and W. T. Thompson, Blue Valley Fert. Co., N. Topeka, Kans.

(3) C. E. Littlejohn, U. S. Potash Co. and Dr. G. N. Hoffer, Olin Mathieson.

(4) F. Calvin, Farmers Union Central Exchange; A. J. Reinberg, Fulton Bag & Cotton Mills and A. H. Stephenson, Consumers Coop. Ass'n.

(5) R. I. Pisle and H. J. Coleman, of Sohio; and W. W. Wilson, Ohio Farm Bureau.

(6) L. Peterson, Midland Cooperatives, Inc. (left) and Len Gopp, International Min. & Chem. Corp.

(7) R. W. Gull, Spencer Chemical Co.; W. Nelson, Am. Potash Institute and W. Huff, Duval Sulphur & Potash, Ashcraft-Wilkinson.

(8) P. Talley, Lion Oil Co.; E. Kapusta, U.S. Potash Co. and Z. H. Beers, MWSIC.

(9) C. R. Martin, Miami Fertilizer Co., Dayton, Ohio; E. M. Kolb, American Potash & Chemical Co., and D. Williams, Minnesota Farm Service Bureau Cooperative.

Industry Safety Congress

By H. H. Slawson

THE phenomenal growth of interest in accident prevention in fertilizer factories brought outstanding acclaim to the National Safety Council's fertilizer section at its fifth annual meeting during the 43rd National Safety Congress in Chicago, Oct. 17 and 18.

Every major fertilizer company in the United States is now a member of the section, Thomas J. Clarke, chairman of the section, reported at the meeting. The safety movement has spread into Canada, he said, and the section's most remote member operates a plant on the island of Formosa.

He quoted National authorities as expressing amazement at the swift spread of the safety program throughout the fertilizer industry in only five years. To date, only two others of the Council's two-score industrial groups have shown any comparable rate of expansion in so short a time, Mr. Clarke stated.

Further indication of the fertilizer industry's intense interest in learning how to operate safely was the registration of over 200 company executives, safety directors and others at the Chicago meeting. This figure, Mr. Clarke said, set a record as the largest to date.

New officers of the fertilizer section, chosen at the opening session, Oct. 17 are: general chairman—Curtis A. Cox, assistant manager, manufacturing, Virginia-Carolina Chemical Corp., Richmond, Va.; vice chairman—E. O. Burroughs, Jr., F. S. Royster Guano Co., Norfolk, Va.; secretary—R. G. Diserens, safety director, Phillips Chemical Co., Bartlesville, Okla.

Practical angles of accident prevention in fertilizer operations were covered by seven speakers in a panel discussion and the Chicago program was rounded out by a number of inspirational talks.

Dr. Charles W. Nelson, Univ. of Chicago, presented a preliminary report on the Motivation Study authorized at the section's 1954 meeting. It was emphasized that this had not yet been approved by the section's executive committee and represented only the conclusions of Dr. Nelson, who is director of research and planning at the University's Industrial Relations Center.

The purpose of the motivation study, Dr. Nelson explained, was to obtain information on the learning habits and motivational patterns of the average fertilizer employee. Based on this information, safety training aids can then be adapted by fertilizer plant management to the needs and interests of the employee, and would have maximum effectiveness. Also developed by the study was an appraisal of the plant's pattern of supervision, to determine how this affects employee motivation and safety. This information, Dr. Nelson explained, would help in training supervisors to operate most effectively in both supervisory and training capacities.

Another objective was to obtain information about personality traits, etc., that could be used in constructing a check list for selecting non-accident prone job applicants in the rush season. He admitted that this phase of the study proved "unrealistic and impractical."

As the study proceeded, Dr. Nelson continued, it became increasingly obvious that it would be among the stable machine operators, not the seasonal laborers, that improvements in safety had to be effected. He discussed means whereby proper safety attitudes can be developed in this group of machine operators.

Briefly stated, here are some conclusions quoted from Dr. Nelson's report:

"The negro fertilizer employee knows that he cannot rise in formal status in the organization. . . . He is not motivated to work for a promotion. He has no reason to take on responsibility or to show initiative in his work in the hope of rising in the organization."

"Employees are very obedient to formal orders. They will carry out such an order, even when they know it won't work. They won't take the responsibility of correcting it, and they know they won't be blamed when it goes wrong."

"Employees feel a great contempt for the foreman. They despise him for his lack of technical ability. They resent his being able to give them orders, and the fact that they must defer to him. They don't feel that the foreman really works. They think he piles it all on them."

"Employees have great respect for the superintendent. They consider him a technical expert who knows what he is doing and has a perfect right to order them around. They see the superintendent as the ultimate authority in the plant. Earning his approval is very important to them."

Dr. Nelson's survey of the supervisory situation in fertilizer plants brought out that there are four types of leadership prevalent. These are the "bureaucratic" leader; the "autocratic type," the "idiocratic" and the "democratic" kind. Each type was discussed as to his manner of controlling his men, and the relative significance of each man's method for handling safety rules.

As to the fertilizer foreman, Dr. Nelson concluded that "there is considerable room for improvement through selection and training." The foreman, he said, "feels that there is very little he can do to develop the individual, and that he has to run

(*Continued on Page 94*)

Can Insecticides and Wildlife Coexist?

By A. C. Martin
Paxtuent Research Refuge
Laurel, Md.

THE possible hazard to wildlife from widespread spraying of pesticides on farms and forests is of growing concern to naturalists, conservationists, and entomologists. Whether or not such fears are warranted can be judged correctly only by longer experience with the spraying programs. Experience to date, however, seems to indicate that we need not anticipate excessive wildlife losses if reasonable care is used in pesticide operations. True, the picture has some dark aspects but there are encouraging factors too.

A favorable point that seems to be overlooked commonly is the fact that as far as insecticides are concerned, game animals are protected to a large degree by their cousins in captivity: man's domestic animals. The first line of defense against toxic materials is manned by chickens, cats dogs, cattle, and the like. They serve as a buffer against extensive and continuing harm to quail, pheasants, grouse, rabbits, squirrels, foxes, and deer. No farmer will fail to do something about it if his poultry or livestock are poisoned, as pesticide manufacturers realize. The same holds true for dogs, cats, and other pets. As long as domestic creatures are not harmed by insecticides, game animals of field and forest are likely to be safe too.

Another reason why it seems unlikely that insecticides will be allowed to cause any significant damage to wildlife is the growing public interest in this matter. A couple of decades ago, the general attitude was comparatively apathetic and it was possible for hundreds of thousands of acres of valuable waterfowl marshland along the North Atlantic Coast to be ruined by drainage on the pretext of mosquito control and work for the unemployed . . . with little protest from the public. It couldn't happen today. The average citizen has become sufficiently wildlife conscious that his representatives in Federal, State, and local government now feel obliged to protect this natural resource as an important land value.

The recent Miller Act restricting amounts of pesticide residues, plus the increasing tendency among manufacturers to make fully adequate preliminary toxicity tests, sometimes using fish and wildlife subjects, are not only valuable steps in themselves but even more important, they attest to the influence of an alert citizenry. When major land-use programs are started nowadays, the agencies concerned invariably consider the wildlife angle and usually discuss it with wildlife organizations. In line with this policy, the United States Fish and Wildlife Service has been invited many times in recent years to consult or participate with other organizations in tests on insecticides.

Further basis for optimism has come from findings on safety limits for DDT. Dosages adequate to control insect pests are generally below the recognized danger limits for nongame as well as game species of wildlife. Treatments of one pound per acre of DDT applied once a year on a forest have given satisfactory control of destructive insects, with no evident harm to game birds or mammals, no permanent effects on fish populations, and a limited reduction of non-game birds. Also, very low rates of DDT such as 0.05 to 0.1 pounds per acre of marshland have been found to control malaria mosquitoes with negligible harm to fish and wildlife, even when repeated a dozen times or more a year. Additional immunity to fish and other aquatic organisms can be assured by avoiding use of emulsions in spray mixtures. Safe methods, safe dosages, and related findings from various studies on new insecticides are indicated in published reports such as Fish and Wildlife Circular 15, "Effects of DDT and other Insecticides and Wildlife" and the 1955 Pesticide Handbook.

Turning to the pessimistic side, it must be recognized that dangers still do exist, some of them minor and some serious. Often wildlife damage of local extent results from lack of knowledge, carelessness, indifference, or accident. Such losses probably cannot be eliminated entirely, even under more ideal conditions than now.

Widespread harm may also be inflicted on wildlife by extensive use of chemicals the potency of which has not been fully tested. This is the most serious danger. Research on effects of insecticides upon wildlife is so limited at present that it cannot possibly keep pace with the rapid release of new chemicals, some of which are much more toxic than DDT. (See "Effects of Insecticides on Wildlife" Paul F. Springer and Arnold O. Haugen, U. S. Fish and Wildlife Service mimeo report.) Consequently, there

(*Continued on Page 105*)

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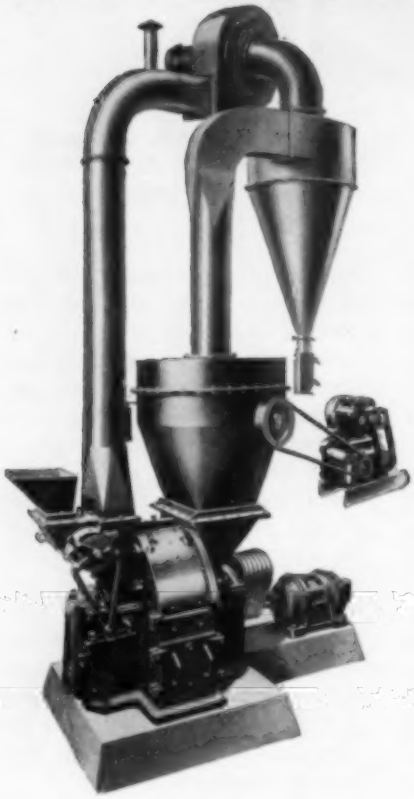

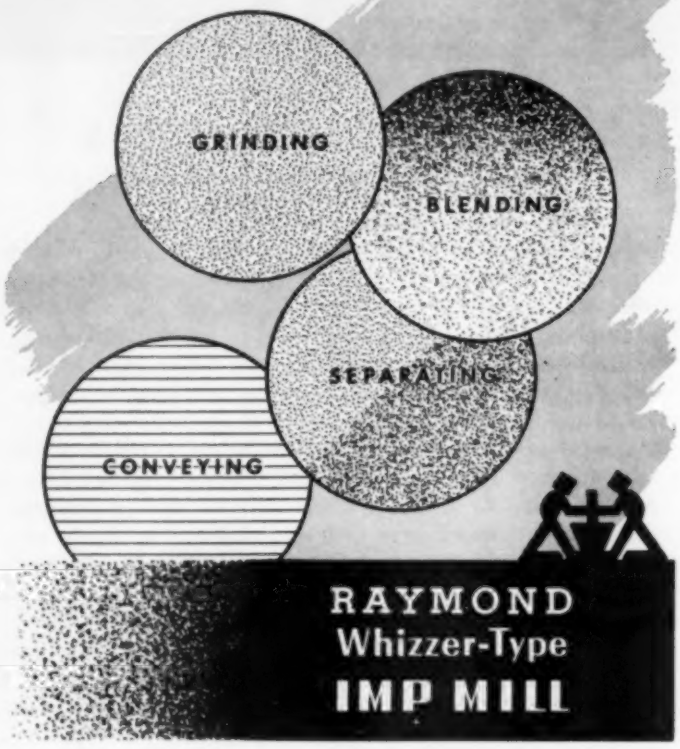

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Fertilizer Round Table...discusses ammoniation, granulation

Part 2

Second part of a report on the meeting of the Fertilizer Round Table held in Washington, D. C. on October 11-12.

THE search for some method of effectively reducing the problem of mechanical condition or bag set has been a long one," R. C. Smith, Eastern States Farmers' Exchange, Inc., W. Springfield, Mass., told Fertilizer Round Table participants, in a review of "Temperature and Moisture Relationships in Granulation." "Of the many techniques and additives which have made their contribution to fertilizer manufacture," he said, "granulation is now regarded as the practical and economical way of accomplishing good mechanical condition."

Mr. Smith indicated that Eastern States, like other organizations, in working on granulation techniques have thought that granulation might be a practical answer to the problem of bag set. He reported further that in granulation and ammoniation studies, it is increasingly evident that temperaure and moisture relationships are extremely important considerations.

Investigation of the ammoniation of superphosphate, with particular attention to heats of reaction and solubility of salts commonly used as fertilizer ingredients, led to the recognition that increasing use of ammonia as anhydrous or in nitrogen solutions *not only could reduce the cost of nitrogen in the mixture,* but would contribute to granulation in the following ways:

(1) Use of sufficiently high amounts of ammonia in the mixture increases the temperature of the batch substantially, and according to a fairly definite ratio.

(2) Large amounts of the salts contained in the mix are dissolved at the temperatures attainable through high ammoniation. These salts, dissolved in the free water, increase the solution phase of the mixture.

(3) Ammonium nitrate and urea are the most soluble of salts commonly used in mixed fertilizers. They also exhibit the greatest increases in solubility, with increases in temperature, which is of particular importance.

(4) During the drying and cooling steps, low moisture content and large amounts of salts in solution contribute to rapid crystallization of salts, resulting in improved permanency of the granules formed during agglomeration.

After reviewing formulation techniques, Mr. Smith reported that it is possible to granulate at imput moisture contents of approximately 6% with 8 or 10% nitrogen grades; and approximately 12% with 5 or 6% nitrogen grades. "A balance between the amount of ammonium nitrate or urea, the moisture content, and the temperature in the mixer is important," he advised. "This balance will vary according to grade, equipment and sources of materials."

"It may be helpful," he said, "to summarize what can be considered approximate moisture and temperature levels at several locations in the process which contribute to granulation. Formulation and other factors affect these figures." (See table 1)

TABLE I

Approximate Temperatures and Moistures of Mixed Fertilizers During Granulation

Fertilizer in:	8-10% Nitrogen °F	8-10% Nitrogen % H_2O	5-6% Nitrogen °F	5-6% Nitrogen % H_2O
Mixer	200	6-7	170	10-12
Granulator	190	5-6	165	9-11
Dryer discharge (co-current)	175	2-3	160	3-4
Cooler discharge	130	1.5-2.0	120	2.5-3.0

In the final analysis, however, Mr. Smith suggested that the most important method of control of temperature and moisture levels is through informed personnel. Plant supervisors and operating personnel who have adequate information on temperature and moisture relationships and who are guided in the effective operation of their granulation equipment have an advantage in the production of quality fertilizer.

Swift Process of Granulation

A process developed by Swift & Co., Chicago, used for the production of semi-granular and granular fertilizers was described by J. E. Iliff, of the Blaw Knox Co., Chicago, which firm is the licensing agent

for design, installation, etc. of the equipment used to produce fertilizer by this process. The system involves batch weighing, screening, and premixing of the solid raw materials . . . although the supplying of solid raw materials is also susceptible to continuous weighing, which would eliminate the need for pre-weighing.

Summarizing the batch weighing system, Mr. Iliff reported that dry materials are weighed and discharged to a batch hopper on a definite time cycle. This hopper feeds the two-ton batch mixer on the same cycle, and each batch is discharged to the surge hopper. The feed screw to the Swift Reactor is equipped with a variable speed drive, so that the level of pre-mixed material in the surge hopper can be maintained within minimum and maximum limits. In this way, a constant feed of pre-mixed dry materials is maintained to the reactor. Liquid raw materials are supplied by plumbing or by pressurized storage tanks, and are fed to the reactor through individual rotometers. The reactor is vented through a vapor stack and the product discharged to storage or to drying or cooling, depending on the type of product being made.

When sulfuric or phosphoric acid is reacted with ammonia in mixing fertilizer, a large volume of steam is developed. In a batch mixer, the escaping steam carries with it much of the reacted ammonia vapor, resulting in substantial losses of nitrogen and local nuisance effects. In the Swift Reactor, Mr. Iliff reported, ammonia that does not react in the feed zone travels the entire length of the reactor through a continuous curtain of falling solids, resulting in practically complete absorption of ammonia by the time the vapors reach the exit. Reaction of ammonia with superphosphates is promoted by the presence of water, and it is believed that the presence of water vapor is a factor in the high absorption efficiency.

The spray method of feeding liquids into the solids, said Mr. Iliff, permits the use of raw materials . . . which develop a high heat of reaction, the evaporation of large quantities of water, and the obtaining of a solids temperature of from 200°-250° F. This results in a much drier product at the discharge of the reactor, and permits granulation with a relatively small "solution phase."

Mr. Iliff reviewed various details of the process: heat of reaction, formulations and water evaporation; particle size; drying and cooling; production rates in each unit; product condition, operating costs; granular production; raw materials costs; investment costs; process advantages, etc. He presented, too, typical operation data for the system, and illustrated the report with slides showing equipment, materials flow, etc.

He advised that in producing granular fertilizer, the best method to assure the complete absence of caking is drying the material to 1% or less moisture content. In this case, he observed, no cooling is necessary unless it is desired to bag or otherwise manually handle the material as it is produced. No caking results when the material is put in storage at a temperature of 200° F. The Swift process, he noted, offers the option of using the dryer as a cooler by cutting off the fuel supply, and saving fuel costs when conditions are favorable for granulation.

Theories and Practices

ONE of the most significant developments in the fertilizer industry has been the doubling of the old long-time rate of 3 pounds of ammonia per unit of P_2O_5 in 20% superphosphate," observed E. C. Perrine, Nitrogen Division, Allied Chemical and Dye Corp., in his address on theories and practices in ammoniation. He continued by remarking that "as more suitable ammoniating media are developed, and some of the shortcomings circumvented, demand focusses more on getting a few more pounds of ammonia into the superphosphate. This is just about the number one problem; and it is through an understanding of the theories and practices of ammoniation that this problem can be solved."

Ammoniation can be effected a little more easily with solutions than with anhydrous ammonia . . . the principle, in any case, remaining the same. The same ammoniation principle applies to the ammoniation of triple superphosphate, but the practical limit of ammoniation seems to be only about half that required for the 20% product. Also, the presence of many large particles reduces the ammonia take-up seriously, as shown in an excellent study on particle size by the USDA.

Normal superphosphate has such a high affinity for ammonia that almost any scheme that brings the two materials into reasonable proximity for a very short time will result in 2.5 to 3.0 pounds of ammonia being taken up per unit of P_2O_5. Superphosphate takes up ammonia beyond this point a little more slowly. A gas will react more slowl with dry materials than will the liquid from which this gas escaped, and it is necessary to provide means for reacting this gas when we go beyond 3 pound rates of ammoniation. This requires intimate contact, combined with either continual or repeated exposure of the superphosphate to the gas. As the task of reacting the gas is the most serious of the ammoniating problems, it is advisable to generate the gas only as fast as it can be taken up in the reactions.

These production problems are almost the same with both nitrogen solutions and anhydrous ammonia. They differ only in degree and not nearly in the degree generally supposed, remarked Mr. Perrine.

Mr. Perrine discussed the various units used for ammonia distribution to bring the ammoniating medium into optimum contact with the superphosphate. He discussed too the use of various aids in ammoniation, and the problem of scrubbing the ammonia gas from the atmosphere inside the mixer.

Mr. Perrine cautioned against indiscriminate and excessive use of acid, "unless there is some valid reason for using more acid than pre-

(*Continued on Page* 114)

LISTENING *Post*

Pink Bollworm Survey; Greenbug Survey, Alfalfa Aphid Name

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Economic Insect Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward

IT is encouraging to report that through October 31, 1955, with one exception, no pink bollworms had been found outside the regulated areas during the fall survey. The one exception was the finding of a pink bollworm moth in a light trap at New Roads, Pointe Soupee Parish, La. This trap was located at the Southern Cotton Oil Company mill. The mill has been placed under a dealer carrier permit which stipulates that no seed on hand would be diverted; that products shipped from the mill be free from contamination with cottonseed and that milling be completed and the premises thoroughly cleaned by a comparatively early date. By the close of October pink bollworms had been found in only five of the 28 regulated counties of Arkansas and only seven parishes of the 18 within the regulated area of Louisiana.

Increases were found in Caddo, DeSoto, Sabine, Calcasieu and Cameron Parishes, La., and in Hempstead County, Ark. Beginning with the western tier of Parishes in Louisiana and extending west to central Texas, north into the eastern half of Oklahoma as far north as inspections had been completed, nearly all counties showed some increase in the degree of infestations as compared to 1954. During the period of October 16-31, 1955, in the older quarantined counties of southwestern Oklahoma pink bollworms were found on lint cleaners at the rate of 14.0 per inspection as compared to 4.6 for the same period in 1954. The average for the combined inspections in the west counties of Crosby, Lubbock, Hockley, Cochran, Bailey, Lamb, Hale and Floyd was 0.86 pink bollworms per inspection as compared to 0.60 for the same period last year.

Green boll inspections in central-east and northeast Texas showed nearly 100 percent of the fields infested, with the buildup in the few remaining late bolls heavy.

Gin trash inspections have been completed with negative results in Alabama, Georgia, Florida and South Carolina.

Alfalfa Aphid Name Changed

Since the discovery of the aphid outbreak on alfalfa in New Mexico in early 1954, the species involved in New Mexico and other States has usually been referred to as the Yellow Clover Aphid (*Myzocallis trifolii*). The taxonomy of the species on alfalfa has been undergoing detailed study and it is definite that there are characteristics which separate it from the yellow clover aphid of the eastern United States. Although further work will be necessary by taxonomists before a generally acceptable scientific name is adopted, it has been agreed that the species on alfalfa which has spread so rapidly since early 1954 will be called by the common name of spotted alfalfa aphid.

The aphid continues to spread, and by early November had been taken in the central and eastern Arkansas Counties of Lonoke, St. Francis and Chicot. The insect has now been reported widespread in southwestern Missouri as far east as Moniteau County and as far north as Howard County. In Nebraska reports have been received from as far north as Blaine and Thomas Counties which are in the central part of the State. Box Elder County, Utah which is along the Utah-Idaho border has also become infested, as has Shasta County, Calif., which is only one county away from the Oregon border.

Population increases of spotted alfalfa aphid have been reported within the past month from California, Arizona, Nevada, Kansas, Arkansas and Texas. Although some of the populations are still below economic levels, damage has been recorded this fall in Riverside County, Calif., and new plantings endangered in Clark County, Nev. In Greenlee County, Ariz., young alfalfa seedlings were being injured. In Murray County, Okla., some new stands were reported killed which in the previous week carried only a light population. The population in most areas has seemed to increase with the cooler fall weather and in Arizona it was pointed out that succulent growth following irrigation was also a factor.

Greenbug Surveys

In a small grain survey conducted in 23 northwest Texas Counties during October, greenbugs were found in the following counties: Crosby, Floyd, Hale, Swisher, Castro, Deaf Smith and Hansford. Highest populations, up to five per linear foot of row, were found in volunteer wheat fields in Deaf Smith and Hansford Counties. Infestations were spotted and very low in most seeded fields.

This is the heaviest and most widespread occurrence at this time

of year that has been found for the past few years. Beneficial insects were rather plentiful and expected to prevent heavy early populations from developing. Late October and early November surveys in several northeast and central counties of Kansas failed to reveal the greenbug. Surveys during late October in central, north central and eastern areas of Oklahoma showed this aphid to be practically non-existent.★★

Control of Stewart's Bacterial Wilt with Streptomycin

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

JOHN J. NATTI, of the New York State Agricultural Experiment Station, Geneva, New York, writes that the general occurrence of Stewart's bacterial wilt in early plantings of sweet corn in New York during 1954 provided an opportunity to conduct tests on the control of this disease by streptomycin applied as a foliar spray. The object of these tests was to determine whether streptomycin sprays would eradicate the disease from naturally infected corn seedlings scattered throughout field plantings. Although the streptomycin sprays failed to exert any apparent therapeutic effects against established infections, the treatments did provide protection against new infections.

The activity of streptomycin and of Agrimycin (15.0% streptomycin and 1.5% Terramycin) against *Bacterium stewartii*, the causal organism of Stewart's bacterial wilt, was assayed by the filter disc and the broth dilution methods. In the filter disc assay method, 24-hour cultures of two pathogenic isolates, 0-1 and G-13, of the wilt organism grown on TGYE (tryptone glucose yeast-extract) broth at 32° C were swab-streaked on TGYE agar in petri plates. A 12.5 mm. filter disc was placed on the agar and 0.1 ml. of the streptomycin test preparation at the desired dilution was pipetted to each disc. The plates were incubated for 24 hours at 32° C and the diameter of the zone of inhibition in each plate was then measured. This diameter measurement included the distance from one outer limit of the inhibition zone, across the center of the filter disc, to the outer limit of the inhibition zone on the opposite side. In the broth dilution method, dilutions of Agrimycin were added to tubes of TGYE broth containing the wilt bacteria. After 24 hours of incubation at 32° C the tubes were examined for inhibition of growth.

In the filter disc antibiotic assay test, growth of the two isolates of *Bacterium stewartii* was inhibited by STS and Agrimycin at dilutions containing active streptomycin at 100, 50, 25, and 10 ppm (Table 1). Inhibition was slight at 10 ppm. With isolate 0-1, the degree of inhibition provided by the various dilutions of STS (streptomycin sulfate) and Agrimycin was identical. With isolate G-13, Agrimycin was more effective than STS. In the broth dilution tests, growth of isolate G-13 was inhibited by Agrimycin at active streptomycin concentrations of 500, 250, 125, 62.6, 31.2, 15.6, 7.8, and 3.9 ppm, but not at 1.8 ppm.

Field tests were conducted at three locations in central New York. At each location, a 4-row strip 500 feet in length in an extensive planting of sweet corn (North Star variety), was divided into 24 plots, each consisting of a 40-foot length of two adjacent rows. The total number and the number of Stewart's wilt-infected corn seedlings in each plot were counted and each infected plant was marked with a stake. The corn seedlings at this time were 6 to inches in height and were infested with the corn flea beetle (*Chaetocnema pulicaria*), the chief carrier of the wilt bacterium. After the plants were counted the plots were sprayed with the streptomycin preparations.

Five different streptomycin preparations were tested (Table 2). Spray suspensions containing active streptomycin at a concentration of 100 parts per million were prepared by adding the required amount of the antibiotic to 5 gallons of water containing 3 ml. of Triton B1956, a wetting agent. Immediately afterward, the antibiotics were applied to the foliage of the corn seedlings by means of a tractor-mounted sprayer equipped to spray two rows at a time with one overhead T-jet #8001 nozzle to each row. The sprayer was calibrated to deliver 55 gallons of spray per acre at 200 pounds of air pressure when operated at a tractor speed of 1.5 miles per hour. The plots at two locations received a single application on June 12; at the third location plots were sprayed twice, June 13 and June 17. Temperatures ranged between 70° to 76° F at the time of application. The treatments were randomized and replicated four times at each location. Unsprayed plots served as controls.

The entire plantings at each location were sprayed periodically with DDT to control the flea beetles. The first DDT spray was applied about 24 hours after the first streptomycin application. Since the DDT effectively controlled the flea beetles, transmission of the wilt bacteria to healthy plants in the plots after tests began was restricted for the most part to the interval between the streptomycin sprays and the first DDT spray.

Infected plants in each plot were counted again 18 to 25 days after the application of streptomycin. Infected plants were observed periodically throughout the season for wilt

TABLE 1

Activity of streptomycin and Agrimycin against two isolates of Bacterium stewartii as indicated by filter disc assay method.

Antibiotic[a]	Dilution ppm[b]	Diameter of inhibition zone (mm.)[c] Isolate G-13	Isolate 0-1
Streptomycin sulfate	100	20	24
	50	18	19
	25	16	17
	10	14	15
Agrimycin	100	25	24
	50	23	19
	25	20	17
	10	16	14

[a] See Table 2.
[b] ppm of active streptomycin
[c] diameter of inhibition zone includes 12.5 mm. diameter of filter disc.

symptoms, and examined also for the presence of bacteria in the vascular tissues.

The incidence of wilt-infected plants in the test plots at the date of the initial count averaged 19 percent at Location 1, 8 percent at Location 2, and 12 percent at Location 3 (Table 2). None of the streptomycin preparations exhibited discernible therapeutic activity against established infections. Wilt-infected corn seedlings sprayed with streptomycin either remained infected for the entire season or succumbed. The incidence of wilt increased in all plots during the interval from the initial to the final count of infected plants (Table 2). However, at each location, the increase in number of infected plants was greater in the untreated plots than in plots sprayed with streptomycin. In the three tests combined, the total increase in number of infected plants from initial to final count in relation to the total number of plants per treatment averaged 7 to 11 percent in the treated plots, and 19 percent in the untreated (Table 2). The differences between streptomycin treatments were not significant. The streptomycin sprays were not toxic to corn seedlings. Healthy plants sprayed with streptomycin were found to produce normal ears.

Some of the plants included in the increase in number of infected plants undoubtedly were infected, but had not developed wilt symptoms before the application of streptomycin. Most of the other plants contributing to the increase in number of infected plants must have been inoculated by flea beetles feeding during the 10- to 12-hour period of daylight, from the time of the application of the streptomycin sprays to the first application of DDT.

The eradication of incipient infections by streptomycin absorbed from the leaf surfaces and translocated to the site of infection may have contributed to the lower incidence of wilt-infected plants in the treated plots than in the untreated. However, the amount of streptomycin supplied by the one or two sprays applied in these tests, seems hardly sufficient to provide for the systemic distribution of the antibiotic within the plants at an effective antibacterial concentration of the antibiotic within the plants.

The lack of any apparent therapeutic effects lends support to this hypothesis.

The lower incidence of wilt-infected corn plants in the plots sprayed with streptomycin as compared with unsprayed plots appears to have resulted from inactivation of the wilt bacteria *before* infections became established. Some of the reduction in

(Continued on Page 101)

TABLE 2

Incidence of Stewart's bacterial wilt of sweet corn in field tests at time of foliar application of streptomycin sprays and 18 to 25 days after application of sprays.

Treatments[a]	Gm. in 5 gal.	Total Plants and Number Infected[b] Location 1 Total Infected 6/12	6/12	6/30	Location 2 Total Infected 6/12	6/12	6/30	Total Infected 6/13	6/13	7/8	Percentage increase in number of infected plants[c]
Streptomycin STS	3.5	327	50	108	285	17	35	237	53	62	9
Streptomycin STC	22.7	318	53	91	313	30	50	239	24	41	9
Streptomycin STB	22.7	298	62	111	294	29	55	271	34	50	11
Streptomycin Broth	18.8	303	61	94	297	23	50	241	25	30	8
Agrimycin	13.3	298	57	80	296	21	51	236	18	28	8
No treatment	.....	306	57	124	309	23	71	231	20	68	19
Total		1850	349	608	1794	143	312	1455	174	279	—
LSD 5%											4
1%											6

[a] Streptomycin STS, STC and STB supplied by Merck and Co., Inc.; Streptomycin Broth supplied by Mathieson Chemical Corp.; Agrimycin supplied by Chas. Pfizer and Co., Inc.. All treatments applied at a concentration of 100 ppm of active streptomycin, one spray application at Location 1 and 2; two applications at Location 3.
[b] Total number of plants in 4 replications of each treatment; number of infected plants at date of initial and final count. The initial count of infected plants at each location indicates incidence of wilt at time of application of antibiotics.
[c] Percentage increase indicates total increase in number of infected plants from initial to final count in relation to the total number of plants per treatment in the three tests combined.

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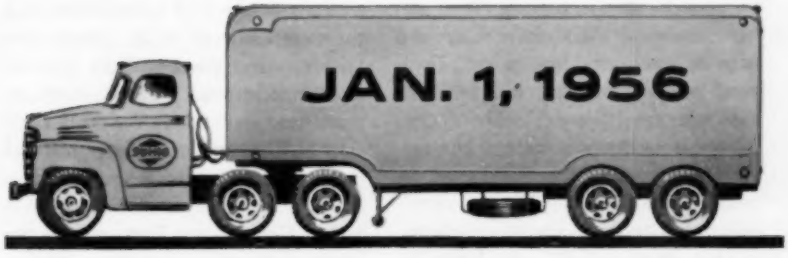

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FERTILIZER
Views and News

By Vincent Sauchelli

AT this time when the farm problem is very much in the news, particularly because 1956 is a presidential election year, it may be pertinent to point out a few basic factors in our economy. One is that commercial fertilizer is a creator of wealth and farmers can and do use the product of our industry to create wealth. Great farm surpluses can be a blessing or a curse; can end in disaster for all, or be turned into opportunity for all. It all depends on the use they are put to.

The farmer who produces a bushel of corn has created that much new wealth. When industry processes that grain, additional new wealth has been created . . . and in addition jobs are created or maintained. The national income is increased. It has been estimated, for example, that the 3 billion bushels of corn grown annually by American agriculture in recent years have created at least $4 billion of new wealth, assuming sales at an average of $1.33 per bushel, and in the processing of this grain almost another $4 billion were added to the income of labor. Economists have shown that the complete processing of farm production through industry adds about $7.00 for each $1.00 of new farm-created wealth. In the case of the corn crop in our example, an amount approximately equal to $28 billion is added to our national income.

Farmers generally do not want a subsidy or dole; they are entitled to a fair market price for their products commensurate with the purchasing value of their newly created dollars.

Civilian employees have a direct stake in farm prosperity, whether they realize it or not. Farm income is the key to the nation's prosperity. It is almost a truism among economists that the total dollar income of industry and manufacturing labor is determined by the existing level of farm income. Agriculture's investment in mechanical equipment, electrical power, chemicals, and gasoline runs into the billions. Today's agriculture is an essential part of the industrial market. If our industry is to operate at full capacity, it seems essential that farm prices and farm income levels should be kept in proper balance with manufactured goods and factory wages. Civilian employees should not condemn the cost of government policies designed to maintain farm income at high levels, without fully considering what such policies may mean in terms of their own payrolls and higher standards of living.

Americans all should realize that national health and prosperity are related to the soil, both in biology and in economics. When we do realize it, more city folks will take a new interest in the land and in conserving our natural resources for our own profit and general well-being.

Fertilizer and Poor Yields

AN English commentator, discussing fertilizer usage, suggests that in order to convince more average or below-average farmers that it pays to use commercial fertilizers, we ought to talk more about fertilizer results from bad and unfavorable cropping conditions. He indicates that many of the reports on the application of fertilizers emphasize high and often well above average yields. Moderate rates of application which have given useful yields, are put in the shade by optimal rates which give exceptional yields: yields such as 125 to 150 bushels of corn, as against 75 to 90 bushels, when the local average may be 55 to 60 bushels. He suggests that farmers whose land is poor or unfavorably situated may turn away from such exceptionally high yield reports, feeling that it is very nice for other people but not for "the likes of me."

He may have something there. We often have wondered why more farmers do not apply the officially recommended rates of fertilizer, particularly when field experiments and the experience of many progressive farmers prove the soundness of those recommendations. Perhaps many of these hesitant farmers feel that their land or farm sites would not respond to the higher rates of application—the not "for the likes of me" attitude. Could be. This points up, perhaps, the need for more on-the-farm demonstrations in order to convince the Doubting Thomases that they too can use fertilizer profitably at optimal rates on their own farms, and reap more profits from higher yields.

How the general public feels towards our fertilizer industry is not easy to gauge. Many persons seem to believe that the fertilizer industry is responsible for the crop surplus problem. This may be due to inadequate public relations work on the part of the industry as a whole. Much publicity is given to such farm news as the record-smashing 304 bushels of corn per acre achievement of a Mississippi farm lad. Not enough attention is given to the indispensable

role chemical fertilizers play today in maintaining the health and vigor of all plant, animal, and human life.

Rivalry Among Phosphates

IS P_2O_5, in the newer phosphate compounds comprising the nitrophosphates, worth as much as that in superphosphate? is being currently debated among Europeans. Keen rivalry apparently exists across the Atlantic among the producers of phosphates. Up till now, we in the U.S.A. have not had much experience with phosphates produced by

(*Continued on Page 97*)

by
Donald G. Lerch
Cornwell, Inc., Washington, D. C.
(Agricultural Chemicals Washington Correspondent)

"YOU'RE safe when you follow the label!"

This is the keynote of the Food and Drug Administration's latest report to farmers — a report that advises growers how to live under Public Law 518, Miller Amendment. Apparently some growers are showing anxiety over their ability to "stay legal in '56." Perhaps they have seen reports telling how crops can be seized and confiscated if the amount of residue is over the permitted tolerance levels.

This anxiety is not unexpected, for certainly any grower with a big investment in land, labor, and agricultural chemicals would be a poor businessman if he was not anxious about the effect of this or any other new law on his business. Some growers are even inquiring about whether they need to have their crops checked by chemical laboratories to assure their compliance with the law. When growers show such concern, there is certainly need for a thorough educational program to present the facts to them before they become even more alarmed.

The Food and Drug Administration assures growers that there is no need for their crops to be so tested. Neither is there cause for anxiety on their part so long as they follow instructions on labels. Dr. Winton B. Rankin, Food and Drug Administration, in a special statement to *Agricultural Chemicals* emphasizes that FDA has been conducting residue studies on growing crops for many years, and has extended its work in this direction over the past two or three growing seasons. The work the Agency does, along with studies by the U. S. Department of Agriculture and by the companies securing label approval, assure growers that crops will be safe as well as legal if label instructions are followed.

However, Dr. Rankin reminds all of us that growers who take short cuts, that is shorten the time between spraying and harvesting, or who double the dose to kill an extra bad outbreak of bugs, or who use any pesticide not in accordance with instructions, may be in violation of the law. It is this type situation which everyone wishes to avoid. Everyone wants safe food. No one wants to see the farmer penalized. No one wants to see industry or the Government accused of failing to live up to their responsibilities.

Parenthetically we might add that there seems to be general agreement that the Food and Drug Administration has proceeded with the unfolding of the Miller Amendment and putting it into actual operation with patience and with full recognition of the problems involved. No one would want to try this patience too far, and no one would want to open the door for hasty criticism of operation of the Miller Amendment.

So it would seem that much of the responsibility for successful inauguration of the law rests with the agricultural leadership, both political and scientific throughout the Nation. Indsutry also has a great opportunity to concentrate its resources and to help do the necessary educational job throughout rural America.

Thus far, most of us have, in effect, been talking among ourselves — scientist to scientist, Congressman to Congressman, industry to industry. We have reached agreement embodied in the new Amendment. Now we must take it to farmers and make it work. That is the real test.

* * *

A further extension in the date when the Miller Amendment will become fully effective on many chemicals was made simply because of the tremendous pressure of work upon the FDA. The latest January 22 deadline for many chemicals sets up a timetable whereby those products for early seasonal application will be passed on first. A second list, those products not needed as urgently at the onset of the growing season, are to have tolerances established by March 1. Hence the two new effective dates, January 22 and March 1, will be important for all companies and all agricultural experiment stations, and others involved in making specific recommendations to farmers and growers on pest control programs.

Admittedly the time to translate Food and Drug findings into easy-to-read, popularized spray schedules is short. It is even shorter when you consider the length of time it takes to get distribution on these schedules. Nonetheless, this is the timetable.

The absolute limit as to date when the entire Amendment must be in operation is July 22. There can

(*Continued on Page 116*)

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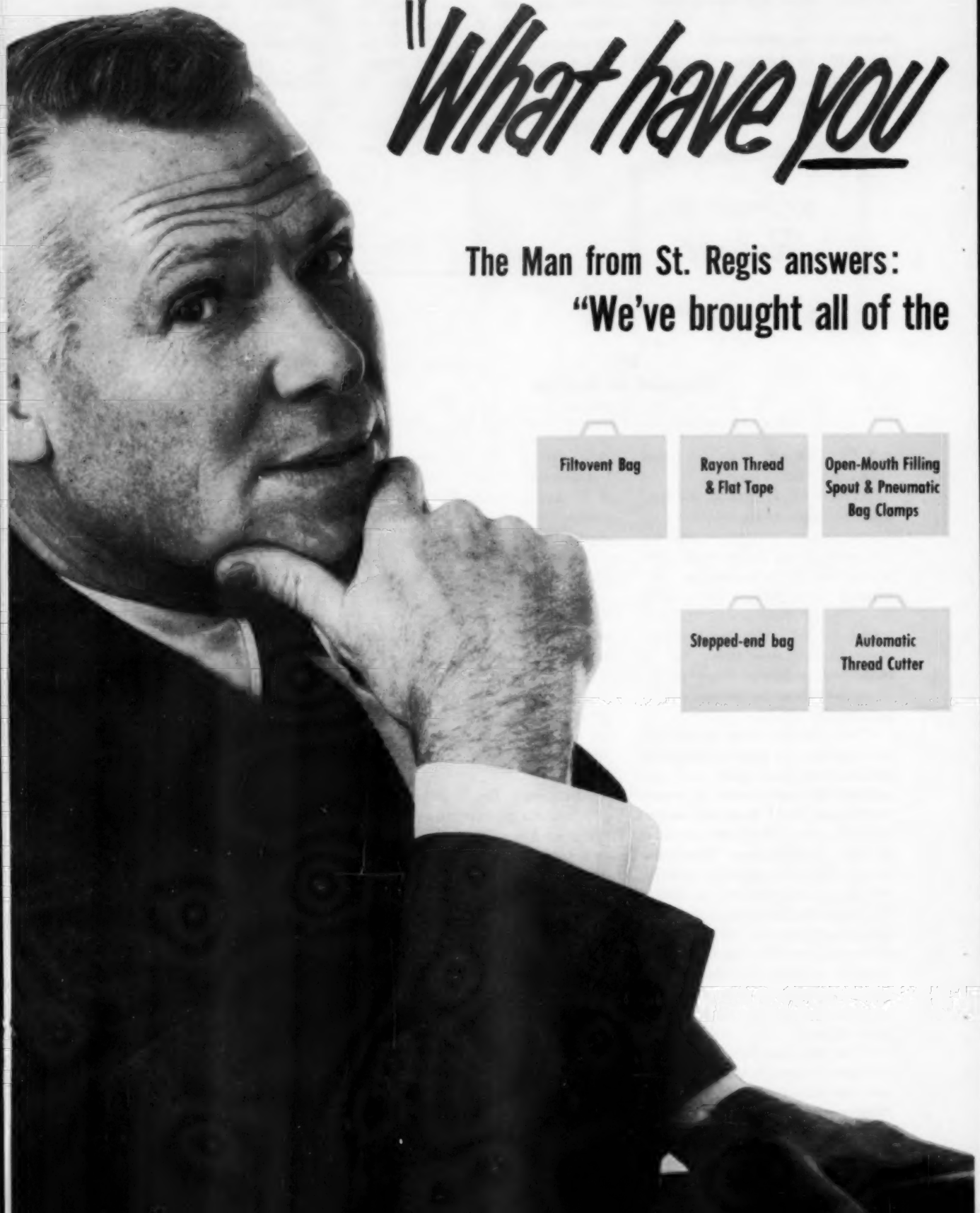
"What have you



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Technical SECTION

Louisiana Recommends Calcium Arsenate in '56 Tentative Recommendations for Boll Weevil Control

TENTATIVE recommendations of the Louisiana State Experiment Station for the control of cotton pests for the 1956 season, recently announced, have been noted with much interest by pesticide formulators and cotton state entomologists, in the light of the published findings by two La. State entomologists (see Agricultural Chemicals, November, 1955, Pgs. 64 & 65) that the boll weevil has developed resistance to chlorinated hydrocarbon insecticides during the past growing season. First on its list of recommended insecticides for 1956, in view of 1955 field experience, is calcium arsenate which it is noted in the bulletin "was the only commercially available insecticide which gave satisfactory control of the boll weevil in some areas of Louisiana during the 1955 season."

Calcium arsenate is recommended as "an economical and effective insecticide for the control of the boll weevil and cotton leaf worm." It is suggested that an aphicide be used with it, as when used without an aphicide, an increase in the aphid population often results.

Entomologists of the Louisiana Station anticipate a possible spread in the resistance problem in 1956, based on previous experience with development of resistance by other insects. They suggest that perhaps more and larger areas in the state may become involved with resistance in the coming growing season. In sections where materials previously used gave normal control in 1955, growers are counseled to continue their previous control measures and materials, but to keep careful watch of their fields, and if control is lost a switch to calcium arsenate is recommended.

Apart from calcium arsenate, other recommended control materials are listed as follows for 1956:

3-5-40 Mixture (3% gamma isomer of benzene hexachloride-5 percent DDT-40 percent sulphur) will control the boll weevil, bollworms, cotton leafworm, cotton fleahopper tarnished plant bug, rapid plant bug, fall armyworm, cutworms, grasshoppers, and will suppress spider mites.

20-40 Mixture (20% toxaphene — 40% sulphur) will control the boll weevil, bollworms, cotton leafworm, cotton fleahopper, tarnished plant bug, rapid

DUSTS

Insect	Insecticide	Lbs. per acre	Time to treat	Intervals between applications
Boll weevil or Boll weevil, bollworms and spider mites	A. Calcium arsenate	7-10	When 25% of squares have been punctured by boll weevils (see discussion for overwintered boll weevils)	4 or 5 days
	B. Calcium arsenate alternated with low-lime calcium arsensate + 5% and 1% parathion	7-10		Same
				Same
	C. BHC-DDT-sulphur, 3-5-40	10-15		Same
	D. Toxaphene-sulphur, 20-40	10-15		Same
	E. Aldrin-DDT-sulphur, 2½-5-40	10-15		Same
	F. Dieldrin-DDT-sulphur, 1½-5-40	10-15		Same
	G. Heptachlor-DDT-sulphur, 2½-5-40	10-15		Same
	H. Endrin-sulphur, 2-40	10-15		Same
Bollworms	A. DDT, 10%	10-15	When eggs and 4 or 5 small bollworms per 100 plant tips are found present.	5 days
	B. Endrin, 2%	10-15		Same
Cotton leafworm	A. Calcium arsenate	10	When leafworms appear	When needed
	B. Toxaphene-sulphur, 20-40	10-15		Same
	C. BHC-DDT-sulphur, 3-5-40	10		Same
Cotton fleahopper	Same as for boll weevil except calcium arsenate	7-10	When 25 fleahoppers per 100 plant tips are found	7-10 days
Spider mites	A. Sulphur	20-25	When mites appear	4 or 5 days
	B. Parathion, 1%	15		Same
	C. Aramite, 3%	20-25		Same
Cotton aphid	A. Parathion, 1%	10-15	When honeydew appears	When needed for "knockout"
	B. Nicotine, 3%	10-15		Same
	C. Malathion, 4%	12-15		Same

SPRAYS

Insect	Insecticide	Pounds of Technical Insecticide Per Acre
Boll weevil	Toxaphene	2—3
or	Aldrin-DDT	.25 aldrin + .5 DDT
Boll weevil	Dieldrin-DDT	.15 dieldrin + .5 DDT
and bollworms	Heptachlor-DDT	.25 Heptachlor + .5 DDT
	BHC (gamma isomer)—DDT	.3 g BHC + .5 DDT*
	Endrin	.2
Bollworms	Toxaphene-DDT	2 Toxaphene + .5 DDT
	DDT	1
	Endrin	.2
Cotton leafworm	Toxaphene	2—3
	BHC-DDT	.3 g BHC + .5 DDT
Cotton fleahopper	Same as for boll weevil	½ to 3/4 of that required for boll weevil control
Spider mites	Parathion	.1 to .2
	Aramite	.6 to 1
	Demeton (Systox)	.25
Cotton aphid	Parathion	.1 to .2
	Demeton Systox)	.25
	Malathion	.5

*Some formulations of .3 lb. of g BHC + .5 lb. DDT have caused plant injury.

plant bug, cutworms, fall armyworm, grasshoppers, and will suppress spider mites.

Aldrin-DDT-Sulphur Mixture (2½ aldrin — 5% DDT — 40% sulphur) will control the boll weevil, bollworms, cotton fleahopper, tarnished plant bug, rapid plant bug, grasshoppers, and will suppress spider mites. Aphid infestations often develop when this mixture is used.

Dieldrin-DDT-Sulphur Mixture (1½% dieldrin — 5% DDT — 40% sulphur) will control the boll weevil, bollworms, cotton fleahopper, tarnished plant bug, rapid plant bug, grasshoppers, and suppress spider mites. Aphid infestations often develop when this mixture is used.

Endrin will control the boll weevil, bollworms, cotton fleahopper, tarnished plant bug, and rapid plant bug. When formulated as a dust it is essential that a stabilizer be added to the mixture. Ordinary diluents without stabilizer are not satisfactory.

Heptachlor-DDT-Sulphur Mixture (2½% heptachlor — 5% DDT 40% sulphur will control the boll weevil, bollworms, cotton fleahopper, tarnished plant bug, rapid plant bug, grasshoppers, and suppress spider mites. Aphid infestations often develop when this mixture is used.

DDT will control bollworms, cotton fleahopper, tarnished plant bug, rapid plant bug, cutworms and fall armyworm. Its use alone may be followed by severe cotton aphid and spider mite infestations. In case of heavy infestation of bollworms, 10% DDT instead of 5% in the above mixtures containing DDT should be used.

Nicotine, 3% in lime, can be used to knock out heavy aphid infestations

Sulphur should be included in all organic insecticide mixures to prevent the build-up of spider mite infestations. Heavy applications will control established infestations.

Aramite at the rate of .6 to 1 pound of the technical material per acre per application, has given satisfactory control of some species of spider mites. It can be applied either as a dust or spray.

Malathion is effective for control of the cotton aphid and spider mites.

Parathion is very effective for control of the cotton aphid and spider mites.

Demeton (Systox) is very effective for control of the cotton aphid and spider mites. It is compatible with all the sprays used for cotton insect control.

Sprays of the insecticides recommended, except calcium arsenate, are as effective as dusts when used in the same amounts and at the same intervals between applications.

Filipin, Antifungal agent

A metabolite of a previously undescribed streptomycete, Filipin, has been isolated and partially purified as a water-insoluble yellow solid. It is relatively nontoxic to plants.

Spraying young tomato plants with 830 ppm. caused no phytotoxicity and reduced gray leaf spot 25 percent. Fungus rot of pea seeds was prevented by soaking in a solution of Filipin. "A New Antifungal Agent, Filipin," David Gottlieb, Alfred Ammann, and H. E. Carter, *Plant Disease Reporter*, 39, 219 (1955).

Vehicle for Pesticides

The use of heavy aromatic naphtha as a carrier for insecticides such as DDT, benzene hexachloride, toxaphene, etc., is described in an article in *Esso Oilways* (October, 1955). The solubility of some 20 pesticides at various concentrations in the Esso solvent is presented in tabular form for periods of 24 hours and 5 days. The article predicts that production of emulsifiable concentrates will increase, while that of wettable and dusting powders will decrease this year and next.

•

Clay—Conditioner Systems

Results of a study of the cation-exchange properties of bentonite and kaolinite, indicate that there is a definite clay-conditioner interaction between bentonite and two conditioning materials tested (a wide range of concentrations of a vinyl acetate-maleic acid copolymer, and an isobutylene-maleic acid co-polymer).

Very low concentrations of conditioner caused a marked decrease in the cation—exchange capacities of bentonite suspension. Slightly higher concentrations increased the exchange capacity for both a monovalent and a divalent cation. A further increase in concentration resulted in a second decrease in exchange capacity, which persisted for all higher conditioner concentrations used. "Cation-Exchange Properties of a Number of Clay-Conditioner Systems," J. A. Archibald and A. E. Erickson, *Soil Science Society of America Proceedings*, Vol. 19, No. 4, Oct. 1955.

•

Iron Chelates for Blueberries

Iron chlorosis of blueberry plants was corrected through soil applications of iron chelates, in tests conducted at Wooster, Ohio.

A single application of iron chelate of EDTA (Dow Chemical Co.) corrected visual symptoms of the disorder for at least two growing seasons, and plants treated showed increases in the iron content of the foliage and improved growth and fruiting. "The Correction of Chlorosis in Blueberries with Chelated Iron Compounds," *Down to Earth*, Vol. 11, No. 2, Fall, 1955.

Yellow Clover Aphid Control

California farmers report that malathion, parathion and systox are giving satisfactory control of yellow clover aphids. Rapid reinfestation and high populations, however, present some problem in control of this pest. Sprays are preferred to dusts, except in the use of toxaphene during seed production.

Parathion may be used at the rate of two to four ounces per acre, or malathion at the rate of 8 to 12 ounces per acre. Systox may be used at the rate of two to four ounces per acre; because of residues, however, applications should not be made within 21 days of harvest. Normal applications of toxaphene will hold the yellow clover aphid in check.

Yellow Clover Aphid on Alfalfa; Chemical Control, R. C. Dickson and H. T. Reynolds, *California Agriculture*, July, 1955.

INDUSTRY PATENTS

2,721,135. HERBICIDAL COMPOSITION. Patent issued October 18, 1955 to John C. R. Warren, Elmira, Ontario, Canada, assignor to United States Rubber Co., New York, a corporation of New Jersey. A low-freezing concentrated herbicidal composition of matter in which the active herbicidal ingredient comprises a mixture of the ethyl and isopropyl esters of 2,4-dichlorophenoxyacetic acid in proportions of from 20 to 55% of said isopropyl ester and correspondingly from 80 to 45% of said ethyl ester, said percentages being by weight based on the sum of said esters.

2,721,126. HERBICIDAL COMPOSITION. Patent issued October 18, 1955 to John C. R. Warren, Elmira, Ontario, Canada, assignor to United States Rubber Co., New York. A low-freezing concentrated herbicidal composition of matter in which the active herbicidal ingredient comprises a mixture of the n-butyl and isobutyl esters of 2,4-dichlorophenoxyacetic acid in proportions of from 35 to 70 percent of said n-butyl ester and correspondingly from 65 to 30 percent of said isobutyl ester, said percentages being by weight based on the sum of said esters.

2,721,127. HERBICIDAL COMPOSITION. Patent issued October 18, 1955 to John C. R. Warren, Elmira, Ontario, Canada, assignor to United States Rubber Co., New York. A low-freezing concentrated herbicidal composition of matter in which the active herbicidal ingredient comprises a mixture of the n-butyl and isopropyl esters of 2,4,5-trichlorophenoxyacetic acid in proportions of from 50 to 85% of said n-butyl ester and correspondingly from 50 to 15% of said isopropyl esters, said percentages being by weight based on the sum of said esters.

2,721,128. HERBICIDAL COMPOSITION. Patent issued October 18, 1955 to John C. R. Warren, Elmira, Ontario, Canada, assignor to United States Rubber Co., New York. A low-freezing concentrated herbicidal composition of matter in which the active herbicidal ingredient comprises a mixture of the isopropyl and sec-butyl esters of 2,4,5-trichlorophenoxyacetic acid in proportions of from 5 to 55% of said isopropyl ester and correspondingly from 95 to 45% of said sec-butyl ester, said percentages being by weight based on the sum of said esters.

2-721,129. HERBICIDAL COMPOSITION. Patent issued October 18, 1955 to John C. R. Warren, Elmira, Ontario, Canada, assignor to United States Rubber Co., New York. A low-freezing concentrated herbicidal composition of matter in which the active herbicidal ingredient comprises a mixture of the ethyl and isopropyl esters of 2,4,5-trichlorophenoxyacetic acid in proportions of from 20 to 60% of said ethyl ester and correspondingly from 80 to 40% of said isopropyl ester, said percentages being by weight based on the sum of said esters.

you can't fly a plane in your laboratory, but...

When your salesmen sell an emulsifiable concentrate, they naturally want to be sure that their own laboratory has tested this product in the way it will actually be used in the field.

Dilution rates are extremely important. If your product is to be sprayed at a 1:3 or 1:10 dilution rate, you'll want to test at those dilutions in your lab.

Below, for example, are practical dilution rates for cotton spray applied by airplane. When you test *your* concentrates at dilutions derived in this manner, as they will be used in the field, you'll be sure that your sales force offers a product that fits the intended conditions. They'll have added confidence in their product.

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FIELD DILUTION RATES FOR COTTON SPRAYS

applied by airplane (2-3 gallons per acre, commercial practice)

Toxicant	lbs. toxicant per acre*	Equivalent concentrate per acre	Calculated actual dilution
2# aldrin	.25—.50	1/8—1/4 gal.	1:7—1:23
1.2# gamma BHC	.30—.50	1/4—3/8 gal.	1:3—1:11
1.5# dieldrin	.15—.50	1/10—1/3 gal.	1:7—1:29
1.6# endrin	.20—.25	1/8—3/16 gal.	1:8—1:23
2# heptachlor	.50	1/4 gal.	1:7—1:11
6# toxaphene	1.0—3.0	1/6—1/2 gal.	1:3—1:17
4-2 mix toxaphene—DDT	1.0—3.0	1/6—1/2 gal.	1:3—1:17

*Based on official state and federal recommendations.

CHEMICALS DIVISION
ATLAS POWDER COMPANY
Wilmington 99, Delaware

Atlas Powder Company, Canada, Ltd.
Brantford, Ontario

2,719,785. HERBICIDAL COMPOSITIONS. Patent issued October 4, 1955 to Gordon B. Johnson, Berkeley, Calif., assignor to California Research Corp., San Francisco, Calif., a corporation of Delaware. An emulsifier, each 100 parts by weight whereof on non-aqueous basis comprises about 25 to about 40 parts by weight of a C_4-aliphatic alcohol and from about 75 to about 60 parts by weight of an anionic surface-active agent selected from the group consisting of sodium C_9-C_{18} monoalkyl benzene sulfonates and sodium C_9-C_{18} monoalkyl sulfates and containing intimately admixed therewith from about 2 to about 15% by weight of sodium sulfate, based on the combined weight of non-aqueous ingredients of said surface-active agent, said emulsifier being capable of emulsifying in water an aromatic petroleum hydrocarbon oil boiling between about 300 and about 750° F. and containing in solution a weed-killing toxicant from the group consisting of pentachlorophenol, 2,4-dichlorophenoxyacetic acid and their salt and ester derivatives.

2,721,132. HERBICIDAL COMPOSITION. Patent issued October 18, 1955 to John C. R. Warren, Elmira, Ontario, Canada, assignor to United States Rubber Co., New York. A low-freezing concentrated herbicidal composition of matter in which the active ingredient comprises a mixture of the isobutyl ester and sec-butyl esters of 2,4-dichlorophenoxyacetic acid in proportions of from 35 to 65% of said isobutyl ester and correspondingly from 65 to 35% of said sec-butyl ester, said percentage being by weight based on the sum of said esters.

2,721,133. HERBICIDAL COMPOSITION. Patent issued October 18, 1955 to John C. R. Warren, Elmira, Ontario, Canada, assignor to United States Rubber Co., New York. A low-freezing concentrated herbicidal composition of matter in which the active herbicidal ingredient comprises a mixture of the isopropyl ester and isobutyl esters of 2,4-dichlorophenoxyacetic acid in proportions of from 10 to 40% of said isopropyl ester and correspondingly from 90 to 60% of said isobutyl ester, said percentages being by weight based on the sum of said esters.

2,721,160. PESTICIDAL COMPOSITIONS AND THEIR USE. Patent issued October 18, 1955 to Jack S. Newcomer, Grand Island, N. Y., assignor by mesne assignments, to The Pennsylvania Salt Manufacturing Co., Philadelphia, a corporation of Pennsylvania. A composition prepared for use in the control of one of the group consisting of microrganisms and insects, comprising a surface active agent, and at least one of the group consisting of 1, 2,3,3,5,5-hexachloro-4 dichloromethylene-1-cyclopentene; pentachloro-1-trichlorovinyl-1,3-cyclopentadiene; pentachloro-5-alpha, beta, beta-trichloroethyl-1,3-cyclopentadiene; 1,2,3,3-tetrachloro-4-dichloromethylene-1-cyclopentene; and 1,3,3,5,5-pentachloro - 2 - trichlorovinyl-4-dichloromethylene-1-cyclopentene, said composition forming an emulsion with water upon agitation therewith.

TRADEMARK APPLICATIONS

IDEAL GOLDEN, in capitals with the word "Ideal" appearing both horizontally and vertically within drawing of clover, for fertilizers, particularly for tobacco plants. Filed Sept. 24, 1954, by Wilson & Toomer Fertilizer Co., Jacksonville, Fla. Claims use since Jan. 1, 1954; and since Nov. 24, 1952, as to "Ideal Golden."

GARD N GRO, in white capitals against dark background, for fertilizers. Filed Dec. 18, 1952, by The Stadler Fertilizer Co., Cleveland. Claims use since Nov. 7, 1952.

SIMPLOT TRIPLE SUPERPHOSPHATE, in red, black and white capitals, for fertilizers. Filed May 29, 1953, by J. R. Simplot Co., Boise, Idaho. Claims use since Apr. 22, 1953.

GUARDSMAN BRAND, in capitals and lower case in a black oval background with figure of guardsman within letter "G," for packaged fertilizer. Filed Mar. 4, 1954, by Van Waters & Rogers, Inc., Seattle, Wash. Claims use since Dec. 19, 1953.

PLANTOIDS, in capitals, for fertilizers. Filed Aug. 10, 1953, by Plantoids, Ltd., Strand, London, England. Claims ownership of British Reg. No. 511,910, dated Apr. 8, 1930.

1955 SUBJECT INDEX

Articles are cross-indexed by listing the principal word of the title as well as the proper name of the article. Index by author's names is also included.

1955 Author Index

CHEMOTHERAPY down on the farm ....

It is now possible to inoculate plants with certain newly developed chemicals to give "built-in" protection against many insect pests. These new chemicals are termed "Systemic" insecticides, and are absorbed into the "system," that is the sap stream of the crop plant — literally giving the plant a chance to "bite back" at its ancient foe.

Man applies these new systemic insecticides by conventional spray methods. Then they are absorbed through the plant foliage, and the sap stream carries them to newly growing tips where they effectively foil the insect's plan for a tender, succulent meal.

Some Systemics are already in use, and scientists expect to find other "medicines" for their ever-growing "prescription counter" that will enable the farmer to protect his growing crop against a host of diseases and infestations.

PENNSALT, a pioneer in the Agricultural Chemicals Industry, plays an important part in the development of Systemics, and these products will join the quality line of PENCO Agricultural Chemicals that are aiding the farmer by increasing his yields of better products and bolstering his economy against losses due to disease and insects.

PENNSYLVANIA SALT MANUFACTURING CO. OF WASHINGTON

TACOMA, WASHINGTON

Philadelphia, Penn., Aurora, Ill., Bryan, Tex., Montgomery, Ala., Los Angeles, Berkeley, Calif., Wenatchee, Yakima, Wash., Portland, Ore.

Pennsalt Chemicals

INDUSTRY *News*

Crutchfield, Calspray Dist. Mgr.

Cecil M. Crutchfield will be the new district manager of the Mississippi Delta area for the California Spray-Chemical Corp. From his office in Troy, Alabama, Mr. Crutchfield will supervise all of Calspray's operations in Alabama, Mississippi, and the adjacent parts of Arkansas, Florida, and Tennessee.

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Pennsalt Fertilizer Plant

The Pennsylvania Salt Manufacturing Co., Philadelphia, has started construction of a plant for the production of new, granular type commercial fertilizers. The product will be included in Pennsalt's I. P. Thomas fertilizer line, and will be distributed domestically and through Pennsalt International Corp.

Pennsalt acquired the 83-year-old I. P. Thomas Company a year ago. Under the continuing direction of general manager R. R. Hull, it has become the sixth operating division of the company. Its distribution facilities cover much of the eastern seaboard.

The new production unit will adjoin Pennsalt's plant and central warehouses at Mantua Point on the Delaware River in Paulsboro, N.J. Principal products of the present plant are conventional commercial and specialty fertilizers, triple superphosphates, phosphoric and sulfuric acids, blended insecticides and "Hy-Phos," a recently developed water conditioning chemical.

The new plant was designed by Pennsalt's central engineering staff and is being built by the Unkefer Brothers Construction Co. of Philadelphia. It is expected to be completed early in January, 1956.

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Garden Research Merges

Garden Research Laboratories, New York, producers of garden supplies has merged with Nutritional Concentrates, Inc., New Lexington, Ohio, manufacturer of equipment for the application of water-soluble fertilizers and other chemical concentrates. The reorganized company retains the Garden Research name and main offices in New York.

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NPFI 1956 Meeting June 10-13

The 1956 annual meeting of the National Plant Food Institute will be held June 10-13 at the Greenbrier, White Sulphur Springs, West Virgina.

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Custom Spray Operators School

The eighth annual Illinois Custom Spray Operators' Training School will be held January 26-27 at the Illini Union Building, University of Illinois, Urbana, Ill. The Illinois Association of Aerial Applicators and the Illinois Ground Sprayers' Association will also have their meetings at this time. Some of the topics to be discussed will be Canada thistle, quack grass, giant foxtail control and weed control in soybeans and corn. Use of granular DDT for corn borer control will also be discussed, along with methods of controlling several other insects.

Arend Heads IMCC Div.

Carl A. Arend has been appointed general manager of the Potash Division of International Minerals & Chemical Corp., it was announced last month by N. C. White, vice president in charge of the division, who until recently was general manager of the Potash Division.
Mr. Arend has been manager of International's mining and chemical operations at Carlsbad, N. M. He will report to Mr. White and will assist him in the management of the Potash Division. He will be located at the general executive offices of the corporation in Chicago.

•

Douglas Names Byrd

New district manager for the Southeastern territory for Douglas Chemical Co., is R. C. Byrd. Mr. Byrd's territory includes North and South Carolina, Georgia, Florida and Alabama. The Douglas Chemical Co., headquarters in North Kansas City, Mo., and manufactures grain protectants, fumigants, insecticides and agricultural chemicals.

•

Joins Carbide's Sales Staff

John D. Mueller has joined the agricultural chemicals sales department of Carbide and Carbon Chemicals Co., a Division of Union Carbide and Carbon Corp., New York.

Mr. Mueller received his B. S. in Agronomy from Washington State College in Pullman, Washington, in June, 1955. He has also done special agricultural chemical development work at Boyce-Thompson Institute for plant research.

Government Pesticide Experts Address Sprayer Manufacturers

A DISCUSSION of the effort which government is making to protect the health and welfare of the nation—through control of vectors of communicable diseases, by enforcement of the Miller Bill which regulates permissible residues of pesticide on food products, and through the Food and Drug Act—was presented by Bradshaw Mintener, assistant secretary, Department of Health, Education, and Welfare, as dinner speaker at the joint meeting of the National Sprayer & Duster Association and the Power Sprayer Division of Farm Equipment Institute, held in Washington, D. C. October 27. His talk was supported by factual reports by Dr. George Bradley, Division of Communicable Diseases, and Winton Rankin, of the Food and Drug Administration.

An insight into the work of the Agricultural Research Service in helping farmers with their problems of protecting farm crops was given at the afternoon meeting. Mr. Kelvin Dorward, Head of the Economic Insect Reporting Service, outlined the activities of a national reporting service which shows those interested in insect control what the current economic insect pests are, where they are found, and whether they are likely to be a serious menace to crops, pastures, livestock, as well as humans.

Dr. W. C. Shaw, Bureau of Plant Industry, made an interesting report on the progress of weed control, with pictures showing various control measures and results being obtained. He pointed out that more acres are now being treated for weed control than for insects and diseases combined. David G. Hall, Chief, Publications Branch, outlined the methods by which Agricultural Research Service gets the latest information to farm families. Dr. E. G. McKibben, Chief, Agricultural Engineering Section, added many useful suggestions on insect and weed control problems.

Mosquito Assn. Jan. 19-20

The newly formed Northeastern Mosquito Control Association will hold its first annual meeting at Waltham, Mass., on January 19-20, 1956. The organization consists of the six New England States and New York, and is composed of men who work in mosquito control and allied fields of pest control. J. F. Pannone is president of the association.

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Diamond Research Scientist

Creation of the position of research scientist within the research organization of Diamond Alkali Co., and advancement of Dr. Alfred Hirsch to the new post were announced at the Diamond Research Center early in November.

In his new capacity as research scientist for Diamond, Dr. Hirsch will have considerable freedom at his disposal to pursue original research studies and projects. At the same time, he will also be responsible for proposing long-range research programs for Diamond, and will function in this connection as an advisor to management on scientific matters of basic interest in the continuing growth and development of the company.

•

AAFCO Publication Available

Official Publication (#9, 1955) published by the Association of American Fertilizer Control Officials will be available by December 1, 1955, at $2.00 per copy. Special discounts will be given on lots of 100 or more copies, according to B. D. Cloaninger, secretary of the association.

The publication contains official definitions of the major fertilizer terms, proceedings of the 1955 annual meeting, model fertilizer bill, (tenth draft) summary of present state fertilizer laws, up-to-date list, addresses and telephone numbers of all fertilizer control officials in the United States, Canada and Puerto Rico. The publication also contains in detail all talks, including charts, graphs and tables, made by capable authorities on the following subjects:

- Plant Food Research as Related to Fertilizer Practices
- Ratios and Multiple Grades as Related to Soil Testing
- New Developments in the Manufacture of Fertilizers
- Current Trends in Complete Liquid Fertilizers
- Acquainting the Public with the Fertilizer Control Officials Program
- Distribution of Bulk Fertilizer in the U. S. in 1953-54

Reports of all investigators, committees on changing fertilizer guarantees from the oxide to the elemental basis and the model state fertilizer bill, are included. Send orders to Box 392, Clemson, S. C.

•

New Salt Producer in Utah

The Hooker Electrochemical Co., Tacoma, Washington, and Pennsylvania Salt Manufacturing Company of Washington with plants at Tacoma and at Portland, Ore., recently formed a jointly-owned subsidiary, Chemical Salt Production Co., at Great Salt Lake, Utah, which will provide a new unlimited inland source of industrial salt. The two companies are now jointly disclosing details of the facility, construction of which was begun in late September, with completion scheduled by April 1, 1956. The plant site of more than 12,000 acres was purchased in late 1953.

•

Approve Stauffer CCI Merger

The merger of Consolidated Chemical Industries into Stauffer Chemical Company was approved by stockholders of both companies at special meetings held in San Francisco, November 14th.

At the Stauffer meeting 2,204,499 shares, or 93 per cent of total shares outstanding, voted in favor of the merger, with 390 shares voting no. At the Consolidated meeting, 223,013 shares of the Class A stock, or 83 per cent of the total shares of such stock, voted in favor of the merger, with 2,985 shares voting no.

After the merger the total assets of Stauffer Chemical Co., the surviving corporation, will be $125,000,000.

Agricultural Ammonia Institute To Meet In Kansas City, December 5-7

HERBERT Pike of Whiting, Ia., one of the 12-man Agricultural Delegation which visited the Soviet Union this summer, will give a first hand account of his Russian tour at the fifth annual convention of the Agricultural Ammonia Institute in Kansas City, Dec. 5-7. Mr. Pike's address will be, "10,000 Miles Through Russia." He will augument his remarks with color slides. The 43-year-old farmer is expected to have an audience of 1,000 or more at the AAI's session at the Kansas City Municipal Auditorium at 11:15 a.m., Tuesday, Dec. 6.

Delegates to the AAI Convention are expected from throughout the nation. More than 1,100 interested in the probiems and profits that go with the use and distribution of agricultural ammonia attended the Institute's convention last year in New Orleans.

Among the speakers at the three-day meeting will be H. B. Sharer of U. S. Rubber Co., New York, who will discuss "What Makes a Star Salesman A Star."; Jack Minnoch of Chicago, executive director of the National Hide & Wool Association; and James H. Andrew of Andrew Farm Store, Jefferson, Iowa, who will review "Distributor Problems."

Five of the nation's leading agronomists will take part in a panel that will conclude the convention. Their subject is "Agronomic and Soil Characteristics of NH_3." Louis B. Nelson, head of the Eastern Soil and Water Management Section, Agricultural Research Service, USDA, Beltsville, Md., will serve as panel leader.

Panel participants will be Daniel G. Aldrich, chairman, Division of Soils, College of Agriculture, University of California, Davis, Calif. W. V. Bartholomew, Iowa State College, Ames, Iowa. George E. Smith, University of Missouri, Columbia, Mo., and W. B. Andrews, Mississippi State College, State College, Miss.

•

Chipman and CIL to Merge

Canadian Industries, Ltd., and Chipman Chemicals, Ltd., plan to merge pesticide operations in a few months, to form Chipman Ltd. While the pesticides business of CIL is being transferred, its agricultural chemicals division will continue its other chemical operations such as manufacture and sale of superphosphate and compound fertilizers and the sale of fertilizer materials. Head office will be in Montreal, Canada, with four plants in Buckingham, Que., Hamilton, Ont., Winnipeg Man., and Moose, Jaw., Sask.

•

Miller Dates Extended

The deadline dates when chemical pesticides must comply fully with the requirements of the Miller pesticide law have been extended until January 22, 1956 and March 1, 1956, for certain pesticides for certain uses, according to an announcement by the Food and Drug Administration early in November.

Chemicals exempted from compliance until January 22 as respects to certain uses are: aldrin, allethrin, calcium cyanide, chlordane, dieldrin, endrin, EPN, ethylene dibromide, "Ferbam," hydrocyanic acid, lindane, methoxychlor, methyl bromide, parathion, phygon, piperonyl butoxide, pyrethrins, toxaphene, "Zineb" and "Ziram."

Pesticides exempted until March 1st are: acrylonitrile, BHC, butoxypropylene glycol, carbon bisulfide, carbon tetrachloride, chlordane, chloropicrin, copper carbonate (basic), DDT, ethylene dibromide, ethylene dichloride, sodium orthophenylphenate tetrahydrate and trichloroethane.

•

N. C. Pesticide School

The eighth annual Pesticide School conducted by the School of Agriculture, North Carolina State College, N.C., is scheduled for January 10-11, 1956, at the College Union Building. Featured on the two-day program will be the 1956 Fungicide Recommendations, a discussion of application equipment, and review of research results on cotton, peanuts, and soybeans.

Other reports to be presented include: "Research in Weed Control" by A. S. Crafts; "The California Extension Weed Program," by W. A. Harvey; "Characteristics and Control of Wild Garlic," by G. C. Klingman; "New Research in Cereal Smut Control," by T. T. Hebert; "Blue Mold and Anthracnose of Tobacco," by F. A. Todd; "Plant Para-

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sitic Nematode Situation in North Carolina," by J. N. Sasser.

"Reports on Soil Fumigation with Nematocides," by L. W. Nielson; "Home and Market Gardens," by J. C. Wells; "An Interpretation of the Miller Bill," by R. O. White. Another series of reports scheduled will review research in: tobacco insect control; fruit insect control; phytotoxicity of insecticide solvents and emulsifiers; cotton insect control; forage crop pest control; insurance methods of control; and vegetable pest control.

•

Atlas Research Program

Atlas Powder Co., Wilmington, Del., realigned its chemical research and development organization and staff to form long-range research and product diversification programs.

The realigned organization consists of three groups: a Chemical Research Department which will conduct long-range projects, a Chemical Engineering Department which will be responsible for all commercial production studies, and a Product Development Department which will undertake market application and customer service work.

Joining the Atlas staff to direct the Chemical Research Department phase of the work is Dr. Walter H. C. Rueggeberg, formerly director of organic research and development for Tennessee Corp.

The Chemical Engineering Department will continue to be headed by Marshall T. Sanders, who has been on the Atlas staff since 1917, and who has directed the firm's chemical engineering work since 1945.

Director of the new Product Development Department is F. Faxon Ogden, who joined Atlas in September after 20 years with Monsanto Chemical Co.

•

Midwest Phosphate Deposits

Midwest co-ops expect to open up phosphate deposits in southwestern Idaho and begin shipping from there late next year. Plans of Central Farmers Fertilizer Co., which is owned by 16 regional co-ops, include a $7½ million furnace to produce 100,000 tons of material a year.

Brown Named Gen. Chem. Pres.

Chester M. Brown has been named president of General Chemical Division, Allied Chemical & Dye

CHESTER M. BROWN

Corp., New York. Mark M. Biddison, who has headed that Division since 1951, will continue his association with the company functioning in an advisory capacity and handling special assignments.

Mr. Brown began his career with General Chemical Division as a production trainee at the East St. Louis, Illinois, Works, in 1929. He was sales and production head of the reagent and fine chemicals line, director of sales, vice president, and in 1952 executive president of the Division.

•

New Pacific C. Borax Plants

Pacific Coast Borax Co., division of Borax Consolidated, Ltd., London, has awarded a joint-venture contract to Southwestern Engineering Co., and Ford J. Twaits Co., both of Los Angeles, for the engineering and construction of new facilities. The new plants will be located at Boron, Calif.

The new plants are expected to have productive capacity in excess of the company's existing plants at Wilmington, Calif. They are scheduled to be in operation in 1957.

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Diazinon for Dairy Barns

Geigy Agricultural Chemicals, New York, announces that "Diazinon" insecticides are now recommended for use in dairy barns. Tests have shown that residual applications in dairy barns do not result in milk contamination.

Diazinon insecticides are reported to have quick knock-down and long lasting residual properties. They are effective agains strains of flies which have become resistant to chlorinated insecticides.

4 lbs. of Diazinon 25% wettable powder in 25 gals of water is suggested for treatment of an average sized dairy barn.

•

Woonsocket Nitroform Div.

The Woonsocket Color and Chemical Co., Woonsocket, R. I., recently established a new division known as the Nitroform Agricultural Chemicals Division, which will handle the sales of urea-form materials. James M. O'Donnell, vice president of Woonsocket, will head the new division.

The trade name "Nitroform" is assigned to the company's new retail product which will be marketed as a 38% urea-form nitrogen through distributors and dealers. It will also be sold to fertilizer companies under the generic name of urea-form. Phil Rosette, former manager of the Kapco division of the Summers Fertilizer Co., has been appointed general sales manager for the Nitroform Agricultural Chemicals Division.

Woonsocket offers a 16-page bulletin "Facts and Figures on Nitroform," which discusses the properties and uses of the new fertilizer product. The bulletin discusses too how much nitroform should be used, on what crops, and when it should be applied.

•

V-C Observes 60 Years

In observing its sixtieth anniversary, Virginia-Carolina Chemical Corp., published an account of the first sixty years and its association with American agriculture and industry in a 50-page illustrated review. Entitled "In Partnership with the Soil," the history of V-C is also a history of the agricultural chemicals industry, . . . particularly as it is related to fertilizer manufacture in the South.

PROCESSING TROUBLES puzzling you?

Solving any puzzle is more easily achieved if key parts can be determined. As a carrier and diluent for insecticides, fungicides, sprays and dusts, Diluex and Diluex A exceed the most exacting qualifications of the agricultural chemical formulators.

Diluex and Diluex A are basically an aluminum magnesium silicate mineral, having an amphibole-like structure possessing a large adsorption capacity in liquid impregnation procedures used in processing the newer complex organic insecticides. Both products are widely accepted as superior grinding or milling aids for technical grade toxicants such as DDT and BHC and will discharge readily from commercial dust applicators giving uniform coverage and minimum fractionation of toxicant and carrier in the swath.

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Young Heads Texas Conf.

Dr. A. W. Young is chairman of the chamber of commerce's program for the Agricultural Chemicals Conference scheduled in Lubbock, Texas, Feb. 14-15. The conference theme will be "The Place of Chemicals in West Texas Agriculture" and will feature discussions in the fertilizer herbicide and insecticide fields. The conference is sponsored by the Texas A & M College System, Texas Tech, Lubbock Chamber of Commerce, and the West Texas Chamber of Commerce.

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Chipman Names McClintic V.P.

Chipman Chemical Co., Inc., Bound Brook, N. J., has announced the appointment of E. C. McClintic as assistant to the president. Before joining Chipman, Mr. McClintic had been associated with the Pure Carbonic Company, New York, where he was vice-president in charge of traffic.

'56 Committees Named For Fertilizer Control Officials

COMMITTEE appointments for the Association of American Fertilizer Control Officials were announced at State College, Miss., early in November by Dr. M. P. Etheredge, who is the newly elected president of the association for the coming year.

On the AAFCO states relations committee, Dr. Etheredge appointed H. J. Fisher of New Haven, Conn., as chairman. Others on this committee are R. C. Prewitt of Columbus, Mo., J. L. Clough o f Dover, Del., J. A. Hennesy of Denver, Colorado, Henry Walls of College Park, Md., W. J. Huffman of Jackson, Miss., and Bruce Poundstone of Lexington, Ky.

Representing the fertilizer industry on the states relations committee are J. R. Archer of the International Minerals and Chemical Corp., East Point, Ga.; E. C. Kapusta of the U. S. Potash Co., New York City, N. Y.; M. D. Sanders of Swift and Co.'s Plant Food Division, Chicago, Ill.; Vincent Sauchelli of the Davison Chemical Co., Division of W. R. Grace and Co., Baltimore, Mr.; S. F. Thornton of the P. S. Royster Guano Co., Norfolk, Va.; W. J. Tucker, G. L. F. Soil Building Service, Inc., Terrace Hill, Ithaca, N. Y.

Dr. Etheredge appointed S. B. Randle of New Brunswick, N. J., to head the uniform fertilizer bill committee. The other members of this committee are Rodney C. Berry of Richmond, Va.; L. E. Bopst of College Park, Md.; B. D. Cloaninger of Clemson, S. C.; E. W. Constable of Raleigh, N. C.; E. A. Epps, Jr., of Baton Rouge, La.; W. B. Griem of Madison, Wis.; K. D. Jacob of Beltsville, Md.; A. B. Lemmon of Sacramento, Calif.; G. H. Marsh of Montgomery, Ala.; F. W. Quackenbush of Lafayette, Ind.; R. T. Wetherbee of Burlington, Vt.; Parks A. Yeats of Oklahoma City, Okla.

A. B. Lemmon of Sacramento, California, heads the special committee on fertilizer guarantees. The others on this committee are K. D. Jacob of Beltsville, Md., B. D. Cloaninger of Clemson, S. C., and F. W. Quackenbush of Lafayette, Ind.

On the uniform lime bill committee, Dr. Etheredge appointed Rodney C. Berry of Richmond, Va., as chairman. The others appointed to this committee are J. B. Smith of Kingston, Rhode Island; and W. B. Griem of Madison, Wisc.

To the other agricultural chemicals committee, Dr. Etheredge appointed F. J. Fudge of College Station, Texas, as chairman; and D. K. Myers of Harrisburg, Pa.; E. A. Epps, Jr., of Baton Rouge, La.; and L. T. Alexander of Beltsville, Md.

H. R. Allen of Lexington, Ky., was named to head the auditing committee. The others named to this committee are John A. Hennesy of Denver, Col., and Henry DeSalvo of Little Rock, Ark. M. B. Rowe of Richmond, Va., will be the new chairman of the credentials committee. Also appointed to this committee are Harry Johnson, Jr., of Atlanta, Ga., and E. R. Tobey of Orono, Maine.

E. D. Schall of Lafayette, Ind., will chairman the resolutions committee. Floyd Roberts of Bismarck, N. D., and D. M. Stalter of Columbus, Ohio, are also on this committee.

The nominating committee will be headed by J. B. Smith of Kingston, R. I. The others members of this committee are Rodney C. Berry of Richmond, Va., and Parks A. Yeats of Oklahoma City.

Appointed as investigators for the association are M. H. Snyder of Charleston, W. Va., general terms; J. W. Kuzmeski of Amherst, Mass., nitrogen products; J. F. Fudge of College Station, Texas, phosphorous; F. W. Quackenbush of Lafayette, Indiana, potassium; J. B. Smith of Kingston, R. I., calcium, magnesium, and manganese.

Rodney C. Berry of Richmond, Va., boron; M. B. Rowe of Richmond, Va., mixing and segregation; George Laramie of Concord, N. H., registration forms; G. H. Ridder of Olympia, Wash., publications; W. J. Huffman of Jackson, Miss., specimen labels; Crawford Winton of Oklahoma City, Okla., tonnage reports; J. C. Jones of Richmond, Va., pesticides in fertilizers; and E. A. Epps, Jr., of Baton Rouge, La., specialty fertilizers.

Headlee Fund Over $44,000

The Thomas J. Headlee Fellowship in Entomology now has a principal fund of more than $44,000, according to a report presented to the advisory council of the Fellowship during its 11th annual meeting at the N. J. Agricultural Experiment Station on October 29th.

The council was welcomed to the State University Campus by Dr. William H. Martin, dean and director of the College of Agriculture and Experiment Station. Dr. Martin pointed out the great need for more fundamental research of the type made possible by the Headlee fund.

Thomas M. Stevens, who has been a Headlee fellow for two years, reported new discoveries concerning the occurrence of hyaluronidase, a spreading agent, in insects. This enzyme was formerly known to exist only in wasps, bees and mosquitos in the insect world, and was believed to function simply as a spreader of venom in the victim.

Stevens has found it in non-venomous insects and has uncovered evidence indicating that hyaluronidase might have a more far-reaching role in the life processes of insects than was heretofore believed.

These studies could lead to insect control methods based on inhibiting the action of this enzyme, Stevens said.

Fred C. Swift, who was appointed to a fellowship this fall, outlined his proposed research to the council. Two of the questions which he expects to explore are: "Why is the female of the species more resistant to insecticides than the male?" And "By what mechanism is an insect able to detoxify a poison?"

An answer to the second question would explain how insects achieve resistance to insecticides.

Research carried on by Headlee fellows over the past 11 years was summarized by Dr. Andrew J. Forgash, assistant research specialist in entomology.

Fourteen of the 34 commercial, industrial and agricultural firms supporting the Headlee Fellowship were represented at the advisory council meeting, which was presided over by

Dr. Franklin C. Nelson, Roselle, Esso Standard Oil Co., representative who is council chairman.

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Farm Fertilizers Names Mgr.

Farm Fertilizers, Inc., Omaha, Neb., announces the election of Thomas J. Hoshall to the position of general manager of the company, effective November 1st. Mr. Hoshall has been connected with the company since July, 1950 and has held the position of vice president for two years. He will now hold the position of general manager in addition to that of vice president.

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New GLF Soil Building Plant

The new $750,000 GLF soil building plant at Big Flats, N. Y., was opened officially in formal ceremonies at the plant. The new building, which will have an annual output capacity of between 25,000 and 30,000 tons will replace a building used by GLF for 12 years and originally constructed in 1912.

Nitro Div. Program

A new public relations advertising program designed to tell farmers how to make money through the adequate use of fertilizer despite the current farm cost-price squeeze has been announced by The Nitrogen Division, of Allied Chemical & Dye Corporation.

The theme of the program, "Fertilizer Grows Farm Profits," is based on studies by government and industry groups. These studies show that double or triple crop yields can be obtained by using more fertilizer and that farmers can thereby get two or three times as much income from the same amount of land, or from lesser acreages in some instances. Increased yields and income enable the farmer to carry fixed costs despite lower crop prices, acreage restrictions and increased cost of things he has to buy.

The program will consist of a series of full-page, two-color advertisements appearing throughout 1956 in leading farm publications. Direct mailing will be made to members of the fertilizer industry, county agricultural agents, farm bankers, and others particularly interested in farm prosperity.

None of the advertisements will mention any fertilizer brand, but will promote the use of all types of mixed fertilizers made by some 1500 manufacturers. Although this is the first time such a program has been conducted on behalf of the whole plant food industry, the Nitrogen Division has for the past two years been sponsoring educational work on fertilizer economics with farm youth groups, such as 4-H and Future Farmers of America, agricultural educators and scientists, and other agricultural leaders.

Nitrogen Division is a major supplier of nitrogen products to the fertilizer industry, having originated the nitrogen solutions with which the majority of all mixed fertilizers are made. Its nitrogen plants are located at Hopewell, Virginia; South Point, Ohio; and Omaha, Nebraska.

Pesticide emulsion problems?

THIS MAN COULD BE ON HIS WAY TO SEE YOU WITH THE ANSWERS

He's one of Armour's staff of emulsion specialists. His job is to help you find *specific* emulsifiers that satisfy *your* requirements for stability and "flash" dispersion. The skill and experience of Armour specialists are available to you at all times. We will select and send you a group of Armour emulsifiers best suited for your testing if you fill in the coupon below. Or, if any of your insecticide or herbicide formulation problems require special laboratory work, an Armour emulsion specialist will travel to your plant and work right along with you.

In the laboratory, Armour specialists develop both non-ionic and cationic emulsifiers. Armour cationic emulsifiers are generally insensitive to varying water hardness. Their herbicidal concentrates are clear and soluble at *any* dilution with fuel or diesel oil. They will emulsify the most potent toxicants at concentrations as low as 2%! That is why less of an Armour cationic emulsifier is required to do the job. Exact specifications insure their uniform, dependable performance.

Under actual field conditions, Armour emulsifiers give immediate dispersions and rapid spreading with minimum runoff and loss. Only after passing the strictest tests and receiving industry acceptance are emulsifiers added to the Armour line. Armour emulsifiers are versatile—one may serve many different formulations. This reduces inventories and simplifies processing. The coupon will bring you further information and samples of outstanding Armour emulsifiers.

FILL IN AND MAIL THIS COUPON TODAY!

Formulation requirements:

Type toxicants used.....

Type solvent used.....

Lbs. Toxicant/gal. of concentrate.....

Water hardness range:.....ppm.

Emulsion stability required.....

Please send me:

☐ Samples ☐ Information

☐ Have technical representative call

Name.....Title.....

Firm.....

Address.....

City.....Zone.....State.....

A12

ARMOUR CHEMICAL DIVISION

© Market Development Department
1355 W. 31st St. Chicago 9, Ill.

Diamond Black Leaf Takes Over Geigy's Iowa Plant

Plans for Diamond Black Leaf Co., Cleveland, O., to take over operation of the Des Moines (Iowa) pesticide processing plant of the Geigy Agricultural Chemicals Division of Geigy Chemical Corp., New York, on December 1 were announced early in November.

The announcement was made jointly by Loren P. Scoville, president of Diamond Black Leaf, and Dr. George R. Ferguson, president of Geigy's Agricultural Chemicals Division.

Built in the fall of 1954 at a cost of $500,000 and put into operation early this year, the Des Moines plant produces insecticides and weed killers for distribution throughout the plains states of Ohio, Michigan, Indiana, Illinois, Kentucky, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Wyoming, Montana, and Colorado.

Dr. Ferguson stated that this move is being made primarily in the interest of intensifying Geigy's activities in the marketing of DDT and Methoxychlor and the further development and production of several outstanding new agricultural chemicals, products of the company's extensive long-range research program.

Diamond Black Leaf Co. was formed in February of this year. The new firm, which absorbed the operations of the Black Leaf Products Division of Virginia-Carolina Chemical Corp., Richmond, Va., manufactures and markets the Black Leaf line of insecticides, herbicides and fungicides.

Mr. Scoville said operation of the Des Moines agricultural chemical plant "gives Diamond Black Leaf its fifth formulating facility, the others being located at Richmond, Virginia; Louisville, Kentucky; Montgomery, Alabama, and Waco, Texas.

•

Named Spencer Wks-Mgr.

Spencer Chemical Co., Kansas City, Mo., announced recently that Richard F. Brown, vice president and general works manager of the company, has resigned to accept employment with another company engaged in the nitrogen business. Mr. Brown's position will be filled by John C. Denton, who had formerly been general manager of engineering and construction for Spencer.

B. Kern has been advanced to general manager of engineering and construction; and R. Byorum has been named chief engineer.

•

Finch Named N. Y. Official

Harold W. Finch was recently named a state control official in the New York State Department of Agriculture and Markets. He succeeds Clifford R. Plumb.

•

Explosion at Velsicol Plant

According to E. T. Collinsworth, Jr., executive vice-president of Velsicol Chemical Corp., the explosion that occurred at the company's Memphis plant on November 2nd, originated at one of the experimental insecticide units. The unit was completely destroyed.

Mr. Collinsworth said that "commercial production of Velsicol insecticides—Chlordane, Heptachlor and Endrin—would not be affected."

Shell New D-D Storage Facility

In order to meet the increased demand in the Southeast for its soil fumigant, D-D®, Shell Chemical Corp. has installed a 1,260,000-gallon storage tank at Wilmington, N. C. The new storage tank received its first tanker shipment from Shell Chemical's plant at Houston, Texas, on October 28th.

From the storage unit, located at the Shell Oil Company terminal in Wilmington, the D-D will be drummed for distribution to farmers throughout the area. This will allow for more efficient distribution of the soil fumigant, ensuring regular shipments to farmers well in advance of the planting season. D-D is used on tobacco, cotton, sugar beets, citrus and vegetable crops.

•

Agronomists Visit O-M Plant

Agronomists from the Great Lakes district visited the Pasadena Ammo-Phos plant of Olin Mathieson Chemical Corp., near Houston, Texas, early in October.

Agronomists on the plant trip included: T. Kurtz and L. D. Miller, Univ. of Illinois; A. J. Ohlrogge and R. Bronson, Purdue Univ.; W. A. Seay and H. Miller, Univ. of Kentucky; R. L. Cook and R. L. Carolus, Michigan State Univ.; H. J. Mederski and G. Ryder, Ohio State Univ.; J. Murdock and C. J. Cottrell and J. Beatty of W. F. Watkins, V. Green, S. Cottrell and J. Beatty of Olin Mathieson.

•

Colo. Ag. Meet Jan. 27

The Colorado Agricultural Chemicals Association will hold its annual meeting together with the Colorado A & M College on January 27th, 1956 at the Cosmopolitan Hotel, Denver, Colo. Fred Chery, president, and Orval Schall, secretary-treasurer, advised that program details will be announced at a later date.

•

Antibiotics in Agriculture Theme

Citing agricultural science as one of the essential elements of progress in world health, Dr. W. H. Sebrell, former director of the National Institutes of Health, reported the world's agricultural production during the last decade has been increased 25 percent. Dr. Sebrell spoke on "Medical Research and World Peace" at the first International Conference on the Use of Antibiotics in Agriculture, held October 19th in Washington, D. C.

The Conference is sponsored by the National Academy of Science, National Research Council and supported jointly by American Cyanamide Co., Merck & Co., Pfizer & Co., and E. R. Squibb & Sons.

Mich. Chem. Appoints Williams

Michigan Chemical Corp., St. Louis, Mich., announces the appointment of Dwight Williams as director of research of the company. Dr. Williams, who resigned as Chief, Biology and Chemical Branch, Quartermaster Research and Development Command, United States Army, Natick, Massachusetts, will be located at the company's research and technical laboratories at Saint Louis, Michigan.

Weed Society Charter Meeting Scheduled for N. Y., Jan. 4-5

THE economic problems caused by weeds and the progress in weed control in the United States, Canada and Great Britain will be highlighted at the charter meeting of the Weed Society of America at the Hotel New Yorker, New York City, January 4 and 5, 1956.

Hosts to the meeting will be the Northeastern Weed Control Conference, whose annual meeting will be held on January 6 following the Weed Society charter meeting.

R. H. Beatty, American Chemical Paint Co., Ambler, Pa., is serving as president of the society during the organization period. Other officers are W. B. Ennis, Jr., USDA, State College, Mississippi, vice-president, and W. C. Shaw, USDA, Beltsville, Md., secretary-treasurer.

The first day of the two-day charter meeting of the Society will be devoted to a discussion of problems, progress and organization of weed control in England, Canada and the United States.

Also scheduled for the first day are talks concerning weed control as a part of American agriculture, industry's views of modern weed control and weed control educational problems in the United States. A report on the mechanisms of herbicidal action will also be presented the first day.

Sectional meetings are planned for the second day to discuss various phases of weed control. Subjects of these sectional meetings will be the control of weeds in agronomic and horticultural crops, control of weeds in turf and non-agricultural areas and weed control teaching and extension. Other subjects for sectional meetings will be the control of aquatic weeds and the public health, regulatory and ecological, physiological and edaphic aspects of weed control.

Sectional chairmen will be:

Control of Weeds in Agronomic Crops—C. J. Willard, Ohio State Univ. and Agricultural Experiment Station, Columbus.

Control of Weeds in Horticultural Crops—R. D. Sweet, Cornell Univ., Ithaca, N. Y.

Control of Weeds in Non-Cultivated Areas—R. A. Darrow, Texas A. & M. College, College Station, Texas.

Ecological, Physiological and Edaphic Aspects of Weed Control—A. S. Crafts, Univ. of California, Davis, Calif.

Weed Control in Turf—G. C. Nutter, Univ. of Florida, Gainesville, Fla.

Public Health—A. H. Fletcher, State Department of Health, Trenton, N. J.

Regulatory—W. S. Ball, California State Department of Agriculture, Sacramento, Calif.

Teaching and Extension—E. P. Sylvester, Iowa State College, Ames, Iowa.

Control of Aquatic Weeds—F. L. Timmons, United State Department of Agriculture, Laramie, Wyoming.

Present plans call for the Weed Society of America to meet every two years with one of the four regional weed conferences serving as host to the meeting.

The program for the Northeastern Weed Control Conference January 6, will consist of panel discussions highlighting new developments in weed control. Panel chairmen for the discussions will be:

Horticultural Crops — L. L. Danielson, Virginia Truck Experiment Station, Norfolk, Va.

Agronomic Crops—D. A. Schallock, Rutgers Univ., New Brunswick, N. J.

Forestry and Industrial Weeds —W. C. Bramble, Pennsylvania State Univ., University Park, Pa.

Aquatic Weeds—Robert Huckins, New Jersey State Fisheries Laboratory, Milltown, N. J.

Public Health—R. K. Sprague, Department of Public Health, Greenwich, Conn.

•

Peacock, Stark Join Escambia

Walter W. Peacock, Jr., of Weston, Mass., has been named sales manager of the polyvinychloride division, and D. J. Stark, plant manager, of Escambia Bay Chemical Corp. It will build a multi-million dollar plant for the manufacture of raw materials for the plastics industry at Pensacola, Fla., the site of its large petrochemical plant which is nearing completion.

Mr. Peacock, a native of Spokane, Washington, formerly was assistant sales manager for Marvinol of the Naugatuck Chemical Division, U.S. Rubber Company, and technical representative in the New York metropolitan area for Stanley Chemical Co. of East Berlin, Conn. He will be temporarily with the National Research Corp. at Cambridge, Mass., which is part owner of Escambia Bay along with Electric Bond and Share Company and United Gas Corporation.

Mr. Stark was formerly manager of the National Petrochemicals Corp. plant at Tuscola, Ill., and chief technologist and department manager in charge of catalytic cracking for Shell Oil Company at its Montreal plant.

Heptachlor 'Winner' at Contest

Farmers using heptachlor to control soil insects reported excellent results and increases in crop yields at a National Corn Picking Contest held near St. Joseph, Mo. on October 15th. A close-up of corn root systems is shown in the photo. The severe damage corn rootworms and cutworms do to corn roots is shown in plant on the left. (Photo courtesy Velsicol Chemical Co.) The healthy root system on the right was taken from a plot treated with Heptachlor . . . which allowed corn plant to develop straight healthy stalk.

•

1st Cotton Production Conf.

Several hundred agricultural leaders from every cotton-growing state will gather at the Hotel Peabody, Memphis, Tenn., December 15-16 to study an "over-all" approach to cotton production problems. The first annual Beltwide Cotton Production Conference will emphasize the importance of fitting together the best "package of production practices" for any individual farm, rather than using a piecemeal approach in adopting new practices.

The National Cotton Council reports that attention also will be focussed on insect control, disease control, chemical weed control, fertilization, irrigation, and defoliation. Attending the meeting will be representatives from all public and private groups throughout the Cotton Belt interested in cotton research.

Previously the Council has sponsored separate conferences on insect and weed control, and defoliation. The production conference not only replaces these three meetings, but brings other problem areas within its scope as well.

Cooperating with the Cotton Council in setting up the meeting are Cotton Belt land grant colleges, the U.S. Department of Agriculture, the agricultural chemical industry, farm organizations, and others. Immediately preceding the conference, and held in conjunction with it, will be separate technical meetings of groups particularly concerned with defoliation, disease control, and insect control.

The group concerned with insect control will be engaged partly in discussing possibilities that several cotton insects have developed resistance to commonly recommended insecticides. Insect experts will discuss these possibilities in their closed technical meeting, then present their findings to the Beltwide Conference.

•

Pesticide Tolerances Established

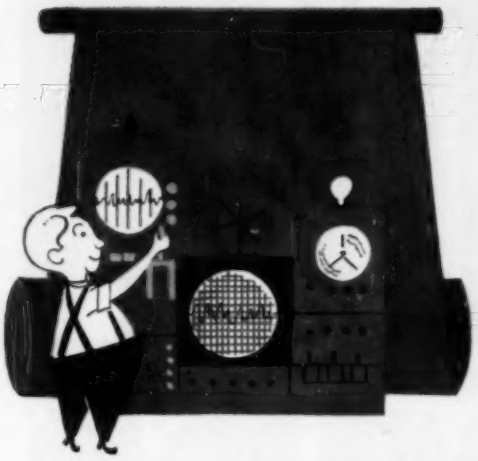
Establishment of residue tolerance limits for three pesticidal chemicals used on agricultural commodities has been announced by the Food and Drug Administration. The pesticides are maneb (manganese ethylenebisdithiocarbamate), malathion, and sulphenone (p-chlorophenyl phenyl sulfone).

The residue tolerance for maneb is fixed at not more than seven parts per million on apples, beans, carrots, celery, cranberries, cucumbers, eggplant, figs, grapes, melons, onions, peaches, peppers, spinach, summer squash, tomatoes, and winter squash, and not more than one part per million on almonds and potatoes.

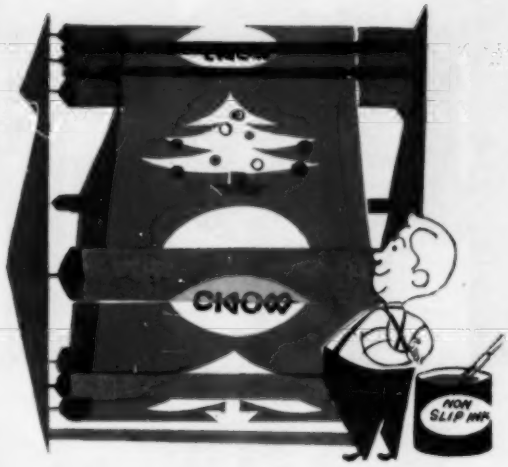
For malathion, the FDA order limits the tolerance to not more than eight parts per million for a long list of fruit and vegetable crops.

A residue tolerance of eight parts per million has been approved for sulphenone when used on apples, peaches and pears, it was announced by the agency recently.

Residue tolerances for Karmex herbicides have also been established by FDA. Tolerances of one part per million for Karmex W and Karmex DW and DL, have been established on sugar cane, pineapples and cottonseed. duPont have also petitioned for a tolerance of two parts per million for Karmex residues on alfalfa and grass crops.

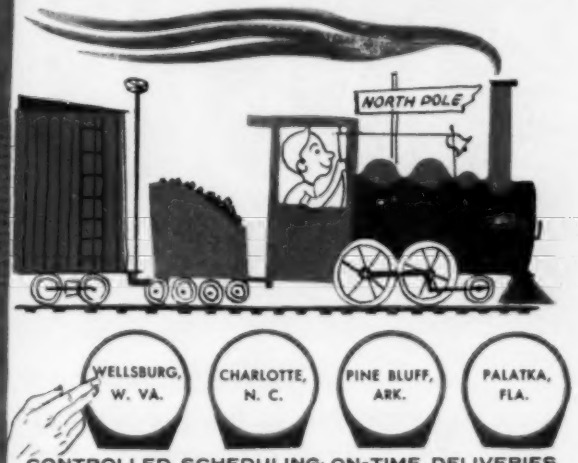


FROM TREES TO NUCLEAR SCANNED KRAFT...



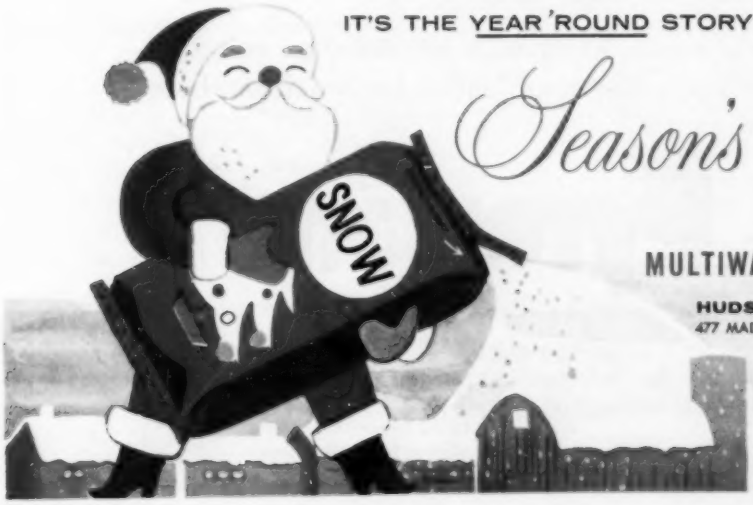
FINE PRINTING WITH A FLAIR FOR SELL...

RIGID INSPECTION AND THE "EXTRA" TOUCH...



CONTROLLED SCHEDULING: ON-TIME DELIVERIES

IT'S THE YEAR 'ROUND STORY OF HUDSON MULTIWALLS!



Season's Greetings

MULTIWALL SACKS by HUDSON

HUDSON PULP & PAPER CORP.
477 MADISON AVENUE • NEW YORK 22, N. Y.

PIPERONYL BUTOXIDE

IN COMBINATION WITH PYRETHRINS

—is backed by *positive proof* that it kills more insects more effectively . . . has greater stability, longer shelf-life, more lasting protectant properties . . . yet is virtually *non-toxic* to human beings and warm-blooded animals.

That makes it the *right* combination for more end uses than any pesticide yet developed. The combination known throughout the industry as—

Pyrenone*

FAIRFIELD CHEMICALS

TRADE MARK

FAIRFIELD CHEMICAL DIVISION
Food Machinery and Chemical Corporation
Sales Headquarters: 1701 Patapsco Avenue, Baltimore 26, Md.
Branches in Principal Cities
In Canada: Natural Products Corporation, Toronto and Montreal

fmc

*Reg. U. S. Pat. Off.

McNeill Joins Summers

Summers Fertilizer Co., Inc., Baltimore, Md., announces the appointment of J. H. McNeill as production manager at Summers' plant in Sioux Falls, South Dakota. McNeill joins the Summers organization after six and one-half years at the Maryland Heights plant of the Missouri Farmers Association, where he has been plant superintendent for the past four years.

•

Savannah Fert. Distribution

Mutual Fertilizer Co., Savannah, Ga., announced late last month, that it has underway a project in Savannah to provide facilities for barge or tankcar discharge into bulk storage.

The object of Mutual's project is to provide shippers of chemicals in liquid form with a saving in transportation by barge into Savannah, and to reduce the investment in tank cars.

•

Grand River Sales Reps

The appointment of Stafford Beaubouef and Bob Gibbs to its sales staff is announced by the Grand River Chemical Division of Deere & Company, Tulsa, Okla.

Mr. Beaubouef will be sales representative for the company in Louisiana and surrounding territory. Mr. Gibbs assumes the position of sales representative in the Iowa-Illinois area. Before joining Deere & Company he was with Lincoln Service & Supply Company as sales manager for their Falls City fertilizer plant.

•

Baughman Appoints Coldiron

The appointment of Henry B. Coldiron as sales engineer representing Baughman Manufacturing Co., Inc., Jerseyville, Ill., for the Eastern United States, Quebec, and Ontario, Canada, was announced recently. He will fly a company owned plane to cover this extensive territory.

•

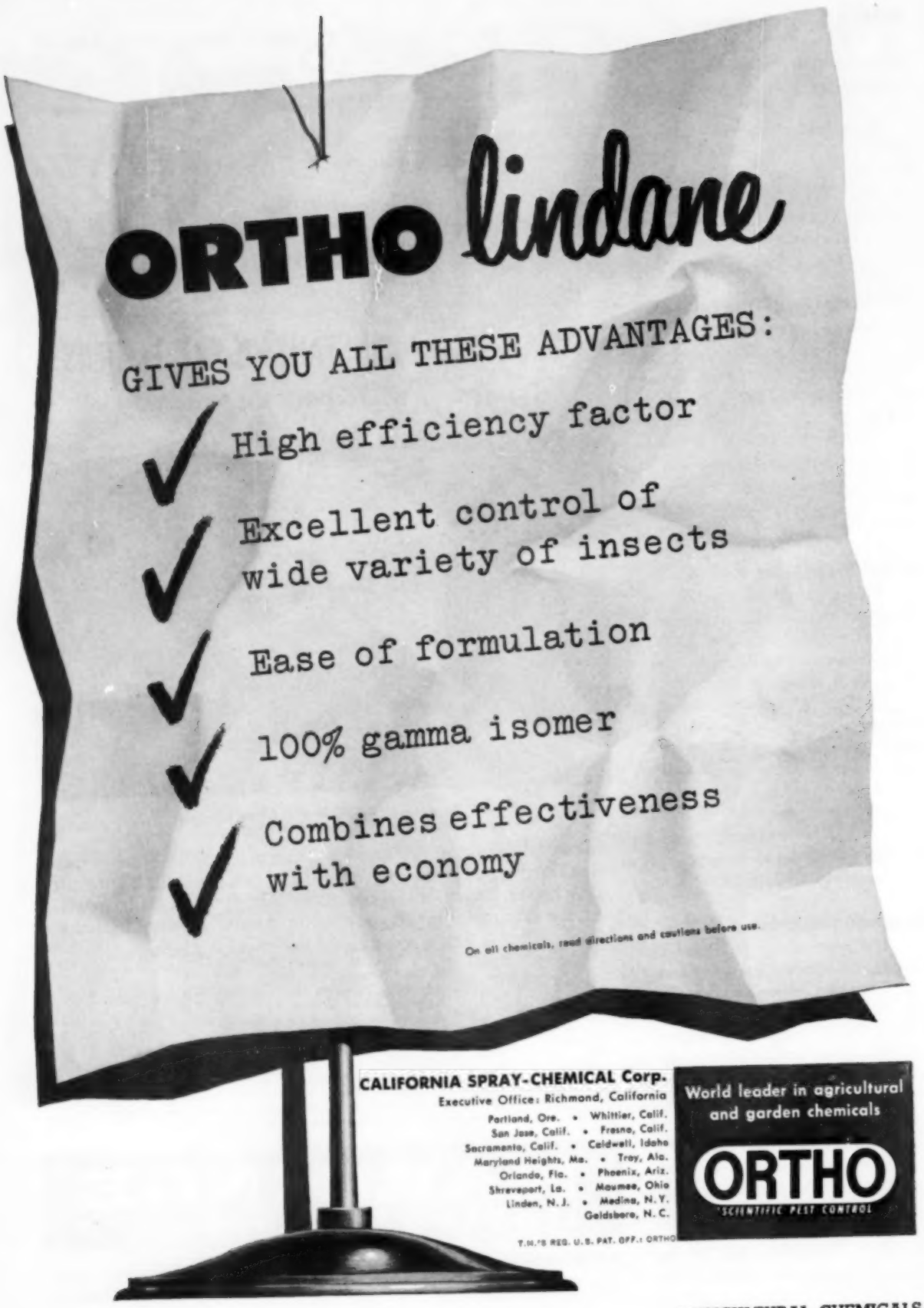
CSMA Meeting in N.Y. Dec. 5

Nearly a thousand research and marketing officials of companies supplying specialty chemicals for use in the home and industry will attend the 42nd annual meeting of the Chemical Specialties Manufacturers Association December 5-7 at Hotel Roosevelt, New York City.

At least 25 technical papers, dealing with product development in the aerosol, automotive, insecticide, disinfectant and sanitizer, soap, detergent and sanitary products, wax and floor finishes industries, are scheduled for the three-day meeting. Nearly a score of other papers will be devoted to marketing practices and legislative matters.

IMCC Names Ware Adm-VP

Thomas Ware, formerly vice president in charge of engineering was recently elected to the post of administrative vice president of International Minerals & Chemical Corp. N. C. White, formerly general manager has been named vice president in charge of the company's potash division.


ORTHO lindane
GIVES YOU ALL THESE ADVANTAGES:
High efficiency factor
Excellent control of wide variety of insects
Ease of formulation
100% gamma isomer
Combines effectiveness with economy
On all chemicals, read directions and cautions before use.
CALIFORNIA SPRAY-CHEMICAL Corp.
Executive Office: Richmond, California
Portland, Ore. • Whittier, Calif.
San Jose, Calif. • Fresno, Calif.
Sacramento, Calif. • Caldwell, Idaho
Maryland Heights, Mo. • Troy, Ala.
Orlando, Fla. • Phoenix, Ariz.
Shreveport, La. • Maumee, Ohio
Linden, N.J. • Medina, N.Y.
Goldsboro, N.C.
T.M.'S REG. U.S. PAT. OFF.: ORTHO
World leader in agricultural and garden chemicals
ORTHO
"SCIENTIFIC PEST CONTROL"

NEWS Briefies

INTERNATIONAL MINERALS & CHEMICAL CORP. said a four-month strike in the Florida phosphate fields caused a $859,509 loss in the first quarter of its '55-'56 fiscal year. The deficit compared with earnings of $561,355 in the three months ended September 30, 1954.

AC

N.Y. HANSEATIC CORP. was recently appointed exclusive distributor by Farbwerke Hoechst, Frankfurt-Hoest, for their calcium ammonium nitrate fertilizer compound "Zebra".

AC

ST. PAUL AMMONIA PRODUCTS INC., St. Paul, Minn., announced a $16 million private placement of securities to finance construction of a plant to produce anhydrous ammonia and other nitrogen products. The plant will have a capacity of 200 tons and will be erected by the Lummus Co. in 1956.

AC

PLANT FOOD CORP., California, recently elected J. Bingham as vice president of the company.

AC

J. D. MUELLER, after training at Boyce Thompson Institute for Plant Research, will be assigned to the sales group for Crag agricultural chemicals at Union Carbide and Carbon Co., New York.

AC

W. D. PERRY was recently appointed packaging specialist for California Spray-Chemical Corp., Richmond, California.

AC

SALES OF OLIN MATHIESON CHEMICAL CORP. in the United States and Canada during the third quarter amounted to $138,340,735. This compared with $126,430,834 in the three months ended September 30th last year.

AC

THE ANNUAL MEETING of the Southwestern branch of the Entomological Society of America will be held February 20-21, 1956, at the Hotel Texas, Fort Worth, Tex.

AC

SOUTHERN NITROGEN CO., Savannah, Ga., recently appointed the Girdler Co., of Louisville, Ky., to construct a $14 million nitrogen plant.

AC

SHELL CHEMICAL CO., LTD., and Fisons, Ltd., have recently announced plans to build two fertilizer plants in England. The Shell plant will be an ammonia plant with capacity of about 75,000 tons. The plant to be built by Fisons will use 60,000 tons of ammonia from the new Shell plant in the production of fertilizers.

AC

MICHIGAN CHEMICAL CORP., St. Louis, Mich., announced an operating profit after taxes for nine months of $203,552 against a loss in the similar period in 1954 of $74,603. This was equal to 38 cents a share on the outstanding 537,077 shares against a 14-cent loss in the 1954 period.

AC

THE SOIL IMPROVEMENT, COMMITTEE of the California Fertilizer Association has annouced the subject of its 1955-56 Fertilizer Essay Contest, "Use of Fertilizer on Pasture and Range Land." The annual contest is open to all vo-ag students at California's Junior Colleges.

SPENCER CHEMICAL CO., Kansas City, Mo., announced the employment of four persons in the chemical research department located at the company's Jayhawk Works in Pittsburg, Kans. New employees include Paul D. Eddy, Jack D. Taylor, Jean Epperly, and Robert M. Smith.

AC

BRADLEY & BAKER, New York City, have appointed L. Paul Campbell, Jr. as sales representative at their Norfolk, Va. office.

AC

JAMES E. CASTLE has been appointed manager of the industrial minerals division of International Minerals & Chemical Corp., Chicago.

AC

DOW CHEMICAL CO.'s research laboratory director, Edgar C. Britton, recently was awarded the 1956 Perkin Medal of the American Section of the Society of Chemical Industry.

AC

DON T. GRANGE has been appointed director of engineering for International Minerals & Chemical Corp., Chicago.

AC

THE MIDWEST GARDEN SUPPLY TRADE SHOW will be held in the International Amhitheatere and Stock Yards Inn, Chicago, January 24-26. Some 5000 dealers of garden supplies, herbicides, tools, seeds and fertilizers are expected to attend.

AC

MICHIGAN CHEMICAL CORP., St. Louis, and Murphy Corp., El Dorada, Ark., announced plans for the construction of a plant for the production of bromine.

AC

PORTLAND SEED CO., recently purchased controlling stock in the Chas. H. Lilly Co. Both firms will continue to operate independently.

AC

F. B. PATTON, general manager of the Armour Auxiliaries, Chicago, has been elected vice president of Armour and Co., Chicago.

AC

SWIFT & CO. announced recently that W. L. Sandel has been appointed Dallas field representative for the Plant Food Division.

Suppliers' BULLETINS

Omega Buln. on Collectors

The problem of eliminating dust nuisance at its source and returning the dust to the system without subsequent handling is described in a four-page color bulletin on dust collectors issued by Omega Machine Co., Division of B-I-F Industries, Inc., Providence, R. I.

The bulletin contains photographs, installation and dimension diagrams plus descriptive information telling how the Omega dust collectors are designed to prevent escape of dust that attends the filling of hoppers, chutes, bucket elevators or screw conveyors.

•

Molybdenum Review Published

A review of industrial applications of molybdenum chemicals has been published by the American Chemical Society and is available in reprint form from Climax Molybdenum Co. Comprising seven different papers, this survey details molybdenum's wide use in diverse chemical fields, and points to new industrial applications resulting from the present increased tempo of molybdenum research. The papers were originally presented under the sponsorship of the American Chemical Society's Division of Industrial and Engineering Chemistry.

•

Bulletin on Barley Diseases

The United States Department of Agriculture announces the release of a new Farmers' Bulletin on diseases of barley.

This publication is illustrated to show diseased parts of barley plants and equipment of various capacities for treating seed. The bulletin discusses resistant and susceptible varieties and has a chart of diseases, causal organisms, and control measures recommended for use against them.

Bennett Describes Lined Pails

Hard-to-handle products such as adhesives, insecticides, grain fumigants, etc., which often become contaminated on contact with uncoated steel can be safely packaged and shipped in standard size steel pails and drums. Special protective coatings or linings are fabricated into a line of containers manufactured by Bennett Industries, Peotone, Illinois. The lined steel containers called "Hi-Bake" pails and drums have phenolic, epon and vinyl resin

AGRICULTURAL CHEMICALS

linings to hold many products that previously caused trouble when shipped in uncoated steel.

Bennett Industries have a new folder which tells what hard-to-hold products will ship safely in Hi-Bake lined steel containers.

•

Buln on Handling Potash

A field report issued by Sauerman Bros., Inc., Bellwood, Ill., includes storage layout drawings and pictures showing operations at International Minerals & Chemicals Corp., and Duval Sulphur & Potash Co., in Carlsbad, New Mexico. The 4-page bulletin reviews the operations in handling potash.

•

Omega Feeders Described

The Omega rotodip liquid feeder is described in a 12-page reprint just issued by Omega Machine Co., a division of B-I-F Industries, Inc., Providence, R. I., entitled "Continuous Processing Equipment for the Fertilizer Industry."

SAFETY COUNCIL

(*From Page 50*)

his job strictly by formal authority." He suggested raising the current pay scale for foremen to attract top quality supervisors. If machine operators were upgraded to a recognized supervisory position, he said, their increased status would make them take an interest in the plant, and be more concerned about getting out production, the safety problem, etc.

In a symposium on "Safety 'Musts,' "Robert P. Henry, agricultural dept., Willson Products, Inc., Reading, Pa., remarked that bugs are not the only creatures endangered by poisonous pesticides. Workers mixing and packaging them constantly face hazards, too, he pointed out. Discussing "Fertilizer-Insecticide Mixing Problems," Mr. Henry said that toxic materials involved affect humans much the same as they do the insects they are designed to destroy. Personal protection thus becomes highly important to the worker. He discussed precautions to be observed, and warned that even with the best protection workers must not be exposed to the toxic materials for any great length of time.

Continued exposure, he warned, increases considerably the chance of serious contamination. He advised frequent medical checkups to detect danger symptoms in the worker. The problem is bound to get worse, he asserted, since, for greater efficiency, pesticides will have to be made more potent and hazardous. Manufacturers will still have to live with them, he observed.

C. L. McDaniel, technical service supervisor, Lion Oil Co., El Dorado, Ark., in discussing hazards in handling liquid nitrogen, emphasized the importance of treating small, second-hand steel storage tanks with great respect. The tanks come cheap, he said, and are more likely to be utilized by the small fertilizer firms which have no safety supervisor or accident prevention program. Repairing them is hazardous, and the work should be done with extreme caution, he advised.

All large processors of liquid nitrogen, he went on, maintain technical service staffs, competent to deal with safe handling problems, and should be contacted through local nitrogen suppliers. He also listed numerous other agencies, governmental and private, from which information is available on safe handling of liquid nitrogen.

D. Lydy, safety engineer, Goodrich-Gulf Chemicals, Inc., Port Neches, Texas, declared, in a discussion of "Electrical Hazards," that too much is taken for granted about electricity." An ordinary 110-volt house current, he asserted, "can and does kill people . . . hundreds of them each year. "His report dealt largely with his company's program for protecting workers from shock on portable electric tools.

F. H. Courtenay, secretary, Federal Chemical Co., Louisville, Ky., named defective electrical equipment, overheated motors, etc., as the cause of most fires in fertilizer plants. Federal Chemical Co., has been burned up four times, he said, and from this experience, he offered suggestions on how to avoid such catastrophes, and how to fight them when they occur.

Mechanical guards for avoiding accidents on processing equipment were discussed by Duncan MacDonald, safety engineer, Anaconda Copper Mining Co., Ananconda, Mont. Hazards of conveyor devices was the subject of another talk by R. G. Diserens, safety director, Phillips Chemical Co., Bartlesville, Okla., and to complete the symposium, Albert A. Waugh, safety supervisor, International Minerals & Chemical Corp., Bartow, Fla., related how his plant is made a safer place in which to work with the help of a manual of rules covering all hazards.

"Too many workers," Mr. Waugh said, "are blind to the hazards of their job, and at times it is difficult to impress on them that the company only wants to help spare them disaster. This makes it necessary to go beyond the rules and make certain that each man understands, and is convinced that it is mandatory to follow the rules."

Mr. Waugh stressed also the importance of full management backing for industrial safety programs. Accident prevention, he declared, must be given continuous attention, along with such other equally important production matters as operating cost, quality maintenance, and volume production.

No safety "expert" can create safety, was the declaration of Max W. Foresman, of Spencer Chemical Co., Kansas City, Mo., in his inspirational talk on "Safety and Human Relations." Eighty percent of all industrial accidents, he claimed, are due not to defective equipment or failure of preventive devices, but solely to the commission of unsafe acts. Safety is thus an attitude of mind, he pointed out, and it can only be attained by the individual through his own efforts. To instill that attitude, he emphasized, the basis of any safety educational program must be recognition of "the worth and dignity of the individual."

"Get the little woman back home interested in safety," he suggested, "and she can do more to promote safety in your plant than all your supervisors put together."

P. W. Logan, loss prevention dept., Liberty Mutual Insurance Co., Atlanta, Ga., in his talk on "Selling Safety" said that one of the most frequent questions asked him is "How can I get men to desire to operate without accidents?"

"What you say," he went on, "makes little difference. It's what the man thinks of you that counts. He described various types of personalities entrusted with accident prevention, ranging from the hot head to the two-faced fellow, the sourpuss, big shot, snooper, jelly fish, belly acher, and the fellow who went to college. He left it to his hearers to decide for themselves which type they were, but suggested that, if conscious of any personality defect, a safety supervisor would do well to mend his ways.

At a general luncheon meeting, the question "Is Safety First?" was raised by B. J. Phillips, safety and personnel director, Coronet Phosphate Co., Plant City, Fla. That slogan "Safety First," he recalled, was coined by the National Safety Council some 40 years ago, but now seems to be losing its significance. Asking "Why?" he asserted that it is because safety has had to take a back seat to production and costs.

There are many reasons why safety must be first, Mr. Phillips continued, but the most important is that safety deals with human beings. People are first, he insisted, and production, costs, and everything else come after people and their welfare. Everything possible must be done for one's employees, he declared. Management must have an earnest desire for an active and effective safety program. There must be no doubt as to this in the minds of employees. It will cost money but, machinery guards, good lighting, ventilation, etc., are a "must" and requests for them must be treated in the same way as requests for new equipment to increase production at lower cost.

"Your safety program," Mr. Phillips emphasized "is a necessary part of your production facilities. It must be accepted in the same way. It should be placed on the same level as other divisions of your activities, your purchasing, accounting, etc., with your production manager in full charge."★★

SOIL COMMITTEE

(*From Page* 49)

To the industry, Mr. Beers remarked, some of this material may seem like "old stuff," but the program is being conducted on the assumption that every year a new generation of farmers arises who have not yet heard the story of fertilizer and how it can benefit farm income.

Speaking of the annual mid-winter conference of fertilizer manufacturers, college agronomists and soil specialists, Mr. Beers related how interest has increased as recognition has been gained of the fact that the conference is a powerful means for keeping abreast of what is going on. As a result, he declared, there is more real cooperative research under way in the corn belt states than exists anywhere else.

Reviewing the Midwestern Committee's work with state agricultural colleges, K. W. Wagenseller, Swift & Co., Hammond, Ind., chairman of the project committee, said grants-in-aid have been allotted to four experiment stations, and certain projects are being supported at two others. New information has been developed, and the practicality of fertilizer is being demonstrated through these academic contacts, he said.

At Michigan State College, he went on, the relationship of soil tests and fertilizer response is being correlated. At the Minnesota station, the program, started in 1949, deals with the effect of fertilizer on the establishment and longevity of alfalfa stands.

In Ohio, the scientists are studying the effect of fertilizer on corn when applied to sod the previous year. The Iowa work is comparing the effectiveness of fall and spring applications of fertilizer. In Kentucky, the studies concern the factors in soil structure that influence the effectiveness of fertilizer in increasing yields and quality of tobacco. In Missouri, cooperation is being given the college

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in its extensive demonstration program. In Wisconsin, over 200 demonstrations each year for the past ten years are playing a significant role in increasing use of fertilizer by Badger farmers.

In reporting on work of the visual aids and promotional literature committee, D. A. Williams, Minnesota Farm Bureau Service Co., St. Paul, Minn., chairman, said production of a folder in color, entitled "You Can Grow Profitable Corn This Year," has been a major accomplishment. Over 200,000 copies have been distributed by member companies to their dealers and customers. It has also been sent, in quantity, to extension workers in every county in the 13-state area, and to vocational agricultural teachers in 2,000 schools.

R. E. Bennett, Farm Fertilizer, Inc., Omaha, Neb., chairman of the literature and film strip committee, said that soon to be released are two new color film strips on band seeding of legumes and on alfalfa production. On schedule, also, are film strips on corn, wheat and small grain and soil testing.

Reports were also submitted by R. G. Fitzgerald, Smith-Douglas Co., Streator, Ill., the committee's treasurer, and by H. E. Wood, Farmers Fertilizer Co., Columbus, Ohio, chairman of the audit committee.

W. M. Newman, Price Chemical Co., Louisville, Ky., was elected president for the 1955-56 term. Other officers named were R. E. Bennett, Farm Fertilizers, Inc., Omaha, Neb., vice president, and George Kingsbury, of Kingsbury & Co., Indianapolis, Ind., treasurer.

Directors chosen for a 3-year term were: J. D. Stewart, Jr., Federal Chemical Co., Louisville, Ky.; R. A. Weis, Virginia-Carolina Chem. Co., St. Louis, Mo.; L. E. Quiram, Illinois Farm Supply Co., Chicago; and E. T. Potterton, International Minerals & Chemical Corp., Chicago.

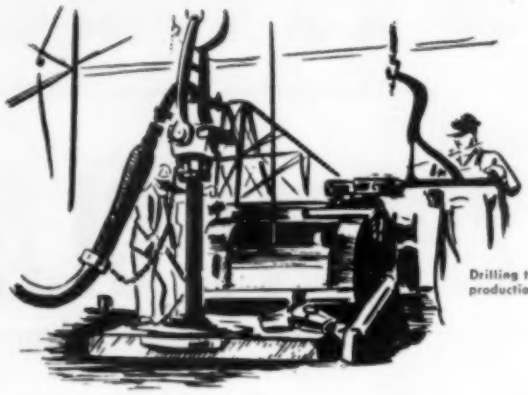
President Newman, before adjourning the meeting, announced that the 1956 midwinter conference will be held at the Edgewater Beach Hotel, Chicago, on the afternoon of Feb. 16 and the morning of Feb 17.★★

FERTILIZER VIEWS

(*From Page 61*)

treating phosphate rock with acids other than sulfuric. The future may see a different picture.

Dr. G. W. Cooke of the Rothamsted Experiment Station recently reviewed the phosphate status before the Fertiliser Society in London. He suggested that farmers expected that the P_2O_5 in the newer phosphatic fertilizers would be sold at a lower per-unit cost than in superphosphates. The field evidence in European countries, as reported by Dr. Cooke, shows that the P_2O_5 efficiency in these newer materials is somewhat lower than in the superphosphates. The limited experience with nitrophosphates in the U.S. tends to support the European evidence. Time will tell how these various phosphates are to be evaluated with reference to soil type,



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crop, and physical condition . . . that is, what effect the physical factor of granulated form may have on the efficiency of the fertilizer. The phosphate in the nitrophosphates is, as you know, not water soluble, but is citrate soluble; whereas in superphosphates, it is about 85% water soluble in normal grades and about 98% to 100% water soluble in the concentrated grades. It is questionable, from an agronomic viewpoint, whether it is wise to produce a water insoluble type of phosphate in the granular form, as is now being done. Granulation in such a case may retard the release of P_2O_5, which is already too slowly available to satisfy the critical needs of early crop growth.

Soil and Liming

IN temperate countries, one of the first things we do to improve the prospects of good harvests on acid soils is to lime them. Not so in the tropics: there to lime an acid soil is the last thing one does; liming may be a real danger and do lasting damage. Many crops in the tropics do best on acid soils. Tea is an example. Furthermore, tropical and subtropical soils in heavy rainfall areas contain trace elements at or near the margin of deficiency . . . and liming, as we practice it, may under such conditions, dangerously decrease the availability of such trace elements. Lime is applied primarily as a source of nutrient calcium, not as a soil corrective. Recently, I have read that lime induced chlorosis on tropical crops, and that it was traceable to recommendations made by soil-testing laboratories unfamiliar with tropical conditions.

People with experience limited to temperate countries are inclined to recommend, on general principles, heavy liming in tropical countries: tons per acre instead of pounds. There is always a danger in generalizing about soil needs. One of the misuses of current soil testing techniques in our own country is the recommending of rates of fertilizer and lime on the basis of some chemical test, which is limited to a specific soil type rather than on the basis of correlated field tests and local experience. The University of Illinois recently warned farmers in that state to beware of soil tests "that have not been calibrated in terms of crop response by carefully conducted field experiments." Unscrupulous persons, it seems, are misusing the soil test to serve their selfish ends. Soil-testing by competent technicians trained in chemistry and agronomy can be a very effective aid in making recommendations for fertilizer and lime. Fertilizer men should be alert to the presence of unscrupulous persons in their communities, whose sharp operations may bring soil testing into disrepute.

Safety

JOHN W. Brennan, a Perth Australia fertilizer factory superintendent, tore a fingernail at work and did nothing about. Within a week he was in the hospital fighting

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desperately for his life. Animal manures used in the plant carried dread tetanus infection to that finger. Despite all efforts, he died. Terrible tetanus spasms shook the victim unmercifully. Such spasms can be brought on by sudden noises. Local newspapers appealed to motorists and locomotive engineers to refrain from tooting horns and sounding whistles while in the vicinity of the hospital. The response was magnificent, showing one touch of nature makes the whole world kin.

The current interest in safety in the fertilizer plant deserves the full-hearted support of every employee: "the life you save may be your own."★★

WASHINGTON SPRAYERS

(*From Page 47*)

present in several eastern Washington areas. Molybdenum, one of the micro-nutrients, is associated with nitrogen utilization, and lack of molybdenum on alfalfa in some areas has been responsible for the appearance of nitrogen-starvation symptoms. An application of 1 lb. per acre of ammonium or sodium molybdate per acre will correct this condition, and could easily be applied by air, Mr. Reisenaur said.

Insecticides and Pilots

DR. WILLIAM UPHOLT, USPHS, Wenatchee, told the group of an interesting experiment set up to learn the effect of known amounts of TEPP on pilot vision and reactions. Measured amounts of TEPP were placed in volunteers' eyes, producing pin-point vision, which resulted in reduced light intensity. No uncertainty was found in judging distances—a thing which pilots have complained about at times. One series of volunteers received TEPP in one eye only, so that a non-balanced condition of vision resulted. All but one of these volunteers complained of some uncertainty of judgment, such as stumbling in walking up or down stairs, or hitting their thumb with a hammer. These results occurred in spite of the fact that they still had satisfactory scores on all of the tests used for reaction measurement—including depth perception. Additional studies on this phase of the problem are planned for the future, Dr. Upholt reported.

Pilot volunteers Alex Berkes, Crop Duster Airways, Inc., Yakima; Harrison Dean, John I. Haas, Inc., Yakima; R. E. Osborne, Rohn Seed Co., Yakima; Ralph Richardson, Airway, Inc., Yakima; James A. Sellers, Yakima Air Service, Yakima; Delbert D. Thomas and Robert A. Young, Flyrite Air Service, Buena; and Carrol E. Meyer and Dale F. Koponen, Economy Pest Control, Yakima, were each awarded a certificate by the Department of Health, Education and Welfare which reads 'In grateful appreciation of services as a volunteer in a research study of broad significance to the advancement of medical science and the ultimate benefit of mankind." The certificate was signed by Dr. Theodore J. Bauer, chief of the Communicable Disease Center, USPHS; Dr. Otis L. Anderson, Chief of the Bureau of State Services; Dr. Leonard A. Scheele, Surgeon General of the Public Health Service; and Mrs. Oveta Culp Hobby, Secretary of the Department of Health, Education and Welfare at the time the experiment was performed.

During the afternoon of the second conference day various types of new and more conventional types of Agricultural Aircraft were demonstarted and displayed at Pangborn and Fancher Fields. The conference was sponsored by Washington State College and the Washington State Aeronautics Commission in cooperation with the Washington State Aviation Association, The Washington Flying Farmers and the Wenatchee Chamber of Commerce.★★

STEWART'S WILT

(*From Page 58*)

incidence of wilt in the treated plots, may be attributed to the inactivation of bacteria in fleabeetle lesions exposed to the streptomycin sprays before infections were initiated. Control provided in this manner would be restricted to the inactivation of only those bacteria recently intro-

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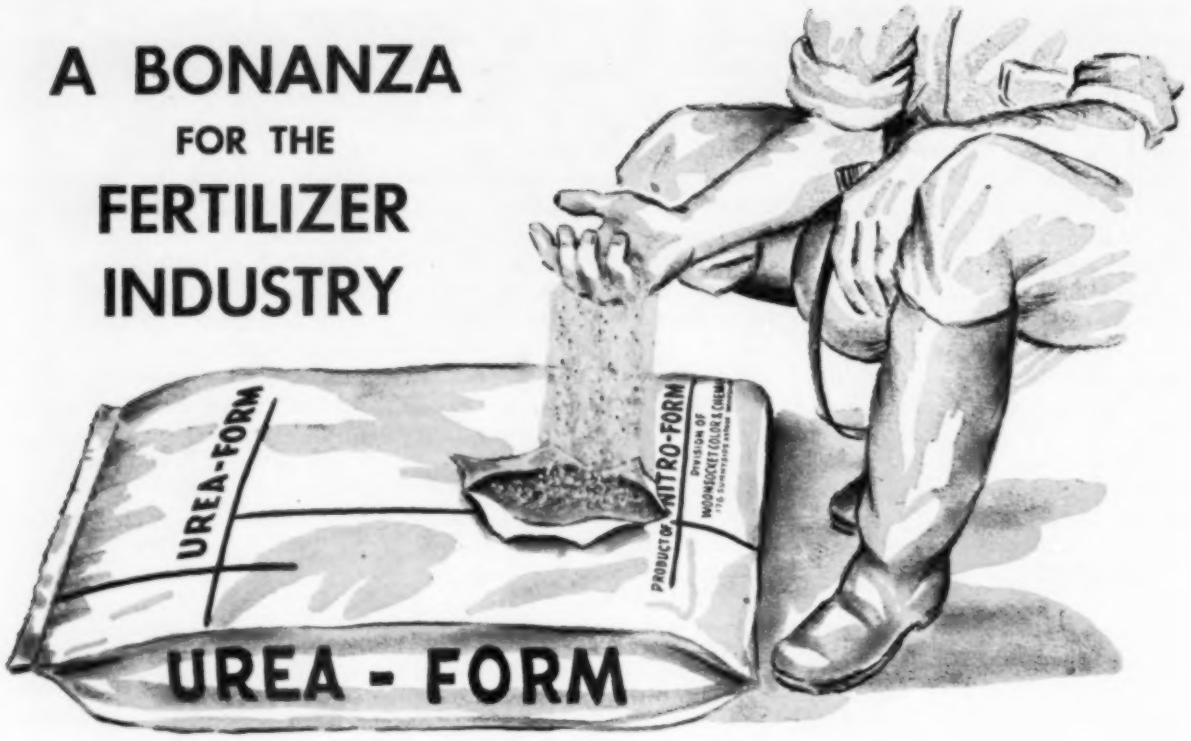

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duced in the flea beetle lesions, and directly exposed to the antibiotic sprays. Inactivation of bacteria on the mouth parts of the beetles, and within the body of the beetles, by streptomycin ingested along with epidermal tissues during feeding on sprayed foliage, could also be a factor.

More frequent applications or higher concentrations of streptomycin than used in these exploratory tests might have had therapeutic effects and resulted in effective control. The absorption and translocation of streptomycin applied as a spray to the foliage of corn should be investigated. The distribution of absorbed antibiotics in corn plants may differ considerably from that described for bean plants, because of the different types of vascular systems. Other antibiotics may be more effective than streptomycin against *Bacterium stewartii*. Aureomycin and Terramycin have been reported more effective than streptomycin against phytopathogenic bacteria. However, although the differences between incidence of wilt-infected plants in plots treated with streptomycin, and in untreated plots were not sufficient to justify any statements as to the value of this method of control of Stewart's wilt of corn, the results were sufficiently encouraging to warrant further investigations on its control by antibiotic sprays.

To summarize: growth of *Bacterium stewartii* was inhibited in filter disc assay tests by STS and Agrimycin at dilutions containing active streptomycin at 100, 50, 25, and 10 ppm. Inhibition was slight at 10 ppm. In broth dilution tests, Agrimycin inhibited growth of *Bacterium stewartii* at dilutions ranging from 500 to 3.9 ppm of active streptomycin, but not at a dilution of 1.9 ppm.

In field tests conducted in 1954, one and two foliar spray applications of five different streptomycin preparations, each at a concentration of 100 ppm of active streptomycin, exerted no apparent therapeutic effects in sweet corn seedlings naturally infected by Stewart's wilt bacteria. However, the streptomycin sprays did provide some control of the spread of wilt, in each of three plantings in which the incidence of wilt at the time of the application of the streptomycin sprays averaged 8, 12, and 19 percent. On the basis of the number of wilt-infected plants counted in the plots at the date of application of sprays, and the number of infected plants in the same plots 18 to 25 days later, the increase in incidence of wilt between these dates averaged 7 to 11 percent in plots sprayed with streptomycin and 19 percent in unsprayed plots.★★

WILDLIFE

(*From Page 51*)

is a serious lag between the commercial introduction of new insecticides and the time, generally years later, when adequate information has been developed on their safety or potential harmfulness . . . information that can be obtained only by careful field and laboratory investigations.

The significance of this lag in needed knowledge has been reflected in recent studies on game birds ("Effects of Chlorinated Hydrocarbon Insecticides upon Quail and Pheasants." James B. DeWitt *Agricultural and Food Chemistry* 3 (8), 1955). It has been found that though bobwhite quail given small dosages of DDT showed no ill effects themselves, their offspring suffered serious consequences. Heavy mortality occurred among young bobwhites hatched from eggs laid by the DDT treated birds, only 7% of them surviving as long as six weeks.

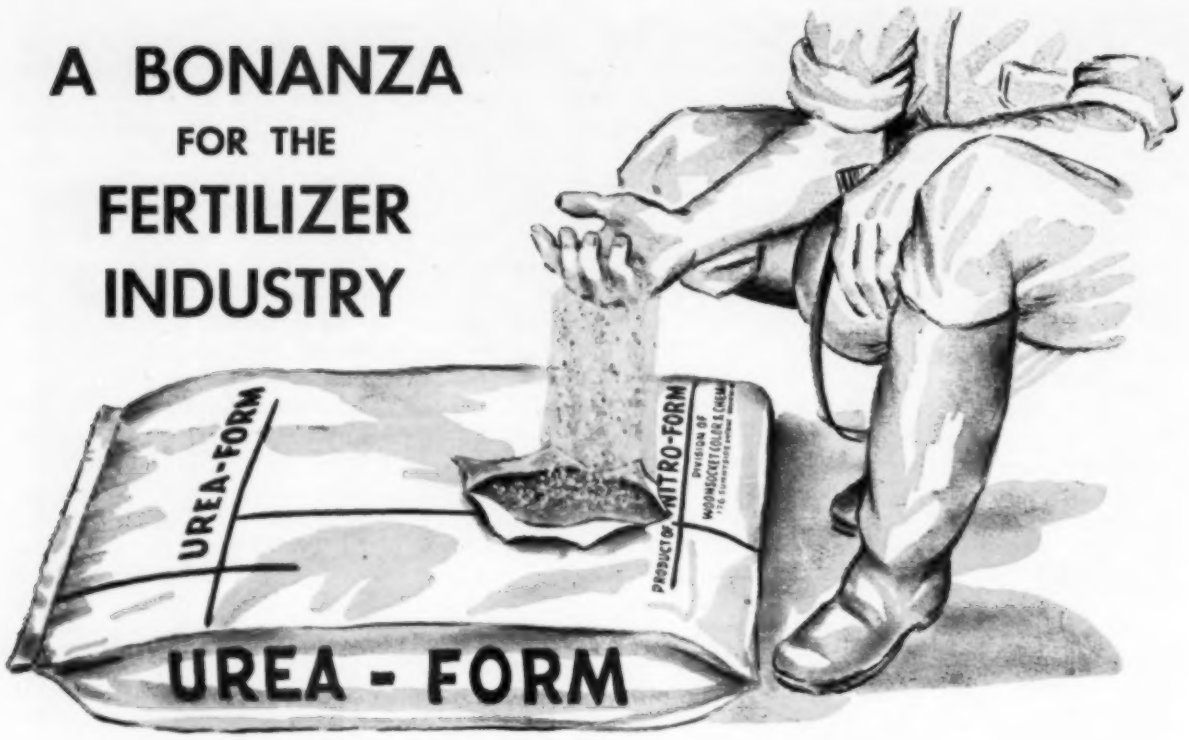
The urgent need indicated is for more research. Only by sufficient facts on insecticides before they are applied widely can potential danger be discovered in time and averted.★★

APPLIED RESEARCH

(*From Page 42*)

precondition for subsequent translocation to the inner leaf layers. The situation is different, of course, when Systox is added to the transplant water because, absorbed through the roots, it will distribute much more evenly throughout the entire plant. However, the transplanting is done at such an early stage of growth that

A BONANZA FOR THE FERTILIZER INDUSTRY



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the toxicant is fully metabolized, decomposed, and thus inactivated long before the crop is harvested. Consequently, this mode of application, properly used, presents no residue hazard.

It must be emphasized that all these considerations apply to Systox, and not necessarily to systemic insecticides in general. An important aspect in the systemic action of Systox is its preferential translocation in the xylem within the plant, a fact which is presumably chiefly due to the physico-chemical relationships between Systox, its metabolites, and the xylem and phloem media, as well as other plant factors. Naturally, the above observations and considerations would not apply to a compound having different physical and chemical properties, or a different metabolism in biological systems, or exhibiting other important variations.

This raises an additional complicating problem; namely, the fact that systemic insecticides often do not exert their action in the same form in which they have been introduced into biological systems, but are oxidized or undergo other chemical changes in vivo.

In this respect, Systox occupies an outstanding position, inasmuch as its metabolism in biological systems has been elucidated by a series of very interesting studies conducted by Metcalf and co-workers (1, 4, 6, 7). The results of these investigations are in remarkable agreement with experiments conducted independently in England and Germany at approximately the same time. They correlate the metabolism of Systox in plants, insects and mammals, and represent a synopsis of the mechanism of action of this chemical which is not available in such completeness for any other presently known pesticide. This imposing compilation of information is, of course, highly important in the practical use of Systox as an insecticide, and in the appraisal of the residue and toxicity picture. However, it is mentioned in this connection not for that reason, but because in addition to its immediate practical significance, it is, in the author's opinion, a signpost for future research. The more information of this type we are able to assemble, the better we will thereby learn to understand the mode of action of currently known pesticides, and the more intelligently we will be able to approach the synthesis of new ones, with less dependence on the good old trial-and-error methods.

In closing, the author wishes to emphasize that this paper is not meant to be a complete evaluation or discussion of any point mentioned, nor a review of the present state of knowledge in organic phosphate research or any part thereof. A few isolated examples relating to Systox and its mechanism of action were mentioned because this product happens to be widely used, and is by far the most carefully studied presently known systemic pesticide. These examples were selected in order to illustrate how very pertinent basic knowledge is, not only to the development of new pesticides, but also to the proper evaluation and understanding of very practical problems, such as are encountered every day in the use of current commercial pesticides.

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(2) Fukuto, T. R., Metcalf, R. L., March, R. B., and Maxon, M. G., Structure and Insecticidal Activity of Some Organic Phosphorus Compounds, paper presented before the Entomological Society of America, Pacific Branch Meeting, at Riverside, California, June 22-24,1955.

(3) Ivy, E. E., Rainwater, C. F., Scales, A. L., and Gorzycki, L. J., Comparative Effectiveness of the Ethyl and Methyl Homologs of Nine Phosphorus Compounds against four Cotton Pests, *Jour. Econ. Ent.* 46, 1953, 4, 630-633.

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(5) Metcalf, R. L., and March, R. B., Properties of Acetylcholine Esterases from the Bee, the Fly, and the Mouse and their Relation to Insecticide Action, *Jour. Econ. Ent.* 43, 1950, 5, 670-677.

(6) Metcalf, R. L., March, R. B., Fukuto, T. R., and Maxon, M. G., The Behavior of Systox Isomers in Bean and Citrus Plants, *Jour. Econ. Ent.* 47, 1954, 6, 1045-1055.

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Give your customers the benefits of chelate chemistry's *first* agricultural iron chelate developed for soils of any pH. Both experimental research and commercial use prove that in iron-deficient plants Versen-OL Iron Chelate can prevent and cure iron chlorosis . . . multiply crop and improve yield . . . stimulate growth and speed maturity . . . turn yellow and dying citrus trees into thriving, profitable producers. This remarkable material gives *new growing power* to both acid *and* alkaline soils, while a second product — *Versene® Iron Chelate* — is especially suited to acid soils.

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(7) Metcalf, R. L., March, R. B., Fukuto, T. R., and Maxon, M. G., The Nature and Significance of Systox Residues in Plant Materials, *Jour. Econ. Ent.* 48, 1955, 4, 364-369.
(8) Muehlmann, R., unpublished data on file at Farbenfabriken Bayer, Wuppertal-Elberfeld, Germany.
(9) von Rümker, R., A Review of Systox, *Agric. Chemicals* 10, 1955, 1, 47-48, 122-123.
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(11) Tietz, H., unpublished data on file at Farbenfabriken Bayer, Leverkusen, Germany.

PESTICIDE SALESMEN

(*From Page 31*)

"last" application is the only one.

4. *What other pesticides, diluents, or spray adjuvants are involved?* Some other components in the spray mixture may be deliberately added to increase the wetting of the plant surface, increase the initial deposit, retard weathering or decomposition of the pesticide, reduce its volatility, or increase its effectivenes in some other way. Thus, the residual deposit of a pesticide remaining two weeks after harvest depends in part on the other constituents that may be in the product or may be added separately to the spray mixture.

5. *What are the weather conditions?* Rain, dew, wind, sunshine, and overhead irrigation, all influence the rate at which the pesticide disappears from the plant. The persistence of a spray residue in the coastal area of California might be greatly different from that in the interior of the state. The persistence of a spray residue in spring might be different from that in fall.

6. *How will the crop be conditioned before marketing?* Some crops are marketed just as they are picked. Others, like canning tomatoes, are thoroughly washed and some, like lettuce and cabbage, are stripped to various degrees at harvest time so the portion exposed to the pesticide is partially or wholly removed and discarded.

But in spite of all these good reasons why a specific and accurate timetable cannot be made for pesticides, we do need and can develop a practical, rule-of-thumb period for most crops under most circumstances. Such a schedule will not give complete assurance that the crop will meet tolerances any more than driving an automobile in accordance with law will guarantee against accidents, but it should provide everyone with a much-needed working basis for action.

At first glance, adoption of a schedule of "safe periods" for pesticides seems not too difficult, and it should be possible to arrive at an ample time to make certain that the residues will be below tolerance in nearly all cases. However, there are practical reasons why such a period will be repeatedly questioned until it is reduced to the point where the deciding factor is: How safe should the safe period be? Growers are sometimes faced with an acute problem where application is needed and harvest is critically close. Manufacturers and salesmen are faced with competitive recommendations and the economic advantages in being able to apply one pesticide a few days closer to harvest than another can be used. At present, the accepted periods for some pesticides are 5, 7, 10, 12, 14, 15, 20, 21, and 30 days before harvest. Of course, for some products the interval is still longer.

Actually, the available data do not and probably never will justify distinctions so finely drawn as 12, 14, and 15 days. There might be some merit in a mutual agreement to speak of weeks instead of days and to use standard intervals of 1, 2, 3, and 4 weeks insofar as recommendations are concerned. This would avoid meaningless comparisons between products in terms of one or two days and avoid debates about whether a farmer can spray today but not tomorrow. The fine distinctions involving one or two days could still be made by the farmer on whose shoulders the responsibility ultimately de-

scends. If he applies a pesticide critically close to harvest, he will be aware of the hazard and can compensate by stripping his lettuce severely or washing his pears thoroughly at harvest time or in some other manner condition his crop to increase his margin of safety.

In the increasing complexity of pesticidal chemicals and the increasing concern as to their possible effect on quality of foodstuffs, we have reached the point where a farmer cannot conduct pest control in an off-hand and irresponsible manner. More farmers need to organize their operations and develop a planned program of pest control in advance, insofar as infestations can be foreseen.

1. Competent and continued surveillance of the field should be made to determine the nature and extent of pest development, of beneficial parasites, and to determine whether the infestation warrants treatment and when treatment should be made. This includes competent identification of insects and mites, knowledge of their potential development and damage, and knowledge of the effects of pesticides on them.

2. The best pesticide should be selected after considering its:

- effectiveness on the pest
- effect on beneficial predators
- suitability for application with available equipment
- effect on neighboring crops if drift occurs
- effect on the taste or quality of the crop
- effect on subsequent crops (BHC may unfit the soil for root crops)
- compatibility with a pesticide previously applied
- compatibility with a pesticide that might be subsequently applied
- effect on honeybees and on neighboring plants where drift may reach
- effect on crop residues (DDT dust may render corn stalks unfit for fodder)
- persistence of residues in light of current tolerances
- price

Fortunate is the salesman who has in his book the best product for every situation, for he will not be faced with the responsibility of having to recommend a competitive product.

3. Applications should be properly timed for the pest, the crop, the area, and the season. A properly timed application requires less material and provides more satisfactory control than an application made at random. It has been known for years that, for some species at least, bugs are much easier to kill when they are young. Although pesticides should not be applied when they are not needed, it is equally important that their use not be postponed when an incipient infestation can be treated effectively. Proper timing can do much to minimize residues at harvest time. In some cases, an effective dormant program reduces the number of summer treatments needed.

4. Pesticides should be applied properly to do their job, and the manner and technique of application cannot safely be abandoned to the discretion of the farmer or the pest control operator unless they are familiar with the techniques involved in use of the particular product. Inadequate coverage, lack of agitation of a spray mixture when it is needed, or improper dilution may fail to provide control, and the material then mistakenly blamed for the failure. For example, a number of complaints have shown that TEPP sprays applied in less than 10 gallons of water per acre have blemished crops by spotting where the concentrated spray droplets hit. The farmer and the aircraft operator should have been impressed with the necessity of using a proper dilution.

Salesmen cannot be saddled with the entire task of educating growers or running their business for them,

and we all know that some growers will not listen to anyone, even those why try to help them . . . but all of us share the responsibility of the salesman in doing the best we can to see that pesticides are used as they should be used. Ultimately, of course, it is the farmer's responsibility to use pesticides properly, but we all stand or fall with him in the degree to which he does what he should do. If a farmer does not handle a pesticide properly, he is apt to get in trouble. He is apt to hurt himself, his livestock, his crop. He is apt to get in trouble with his neighbor if the material drifts across property lines. He is apt to get in trouble with his processor or with agencies enforcing spray residue tolerances. And an industry with a customer in trouble is in trouble itself.

This is not to imply that a pesticide salesman must be an entomologist, a plant pathologist, a marketing economist, and a chemist, or be competent to provide advice on all these technical problems himself, but he should know, and be constantly aware, that a farmer operating without benefit of such advice may be heading for trouble—and taking the salesman with him. When men are climbing a mountain, roped together, just as a salesman and a farmer are together concerned in use of a pesticide, the welfare of each is the immediate concern of the other. If the farmer is in trouble, the salesman is too.

It is the responsibility of the pesticide salesman, backed by all the assistance that industry and advisory and regulatory agencies can give him, to do his best to see that pesticides are used when they are needed, where they are needed, and how they are needed. He should do his best to see that pesticides are not used too much, too often, or too late. It is his responsibility to do his best to sell not just a pesticide but an effective pest control program.★★

FERTILIZERS AND YOU

(*From Page 33*)

involves manufacturer, retail merchant, farmer customer, and local banker. But the problem is too important to ignore, and to solve it is a "must." The men in our industry have been able to solve the problem of credit, as it applies in a big way to the financing of transactions, which enable them to stockpile all the raw supplies for a full season's production long before they start shipping any of the finished product. That certainly has required ability and friendly relations with the big banking centers. But the credit problems at the retail end of the business have yet to be solved as successfully. It will take time to do this. There are about 12,000 banks in this country with resources of less than $10 million, each of which can be classified as country banks. They are the ones that have to handle credit at the retail and farmer level. As I understand it, the average country banker, despite his acquaintance with farmers and dealers in his farming community, is generally not too familiar with all the phases of this credit problem. His knowledge of modern farming practices, and the role fertilizer plays in profitable crop production is also limited.

All who can must help to bring knowledge and understanding of the requirements of today's new agriculture to bankers and other leaders in every community in which we do business. Many state bankers associations have already taken the initiative in promoting educational programs in their respective communities. The fertilizer industry should cooperate in these programs at the local level. The educational agencies of the industry's trade associations and those of many of the individual companies have begun to cooperate with bankers and other business men to help create a better understanding of these credit problems. More of such cooperation at the grass roots will, I am sure, find the answer to this problem.

The new and broader concept of the role of fertilizer in the nation's economy will keep on generating demand for fertilizers—a demand influenced more by the needs of nutrition, sound farm practices and national security than by the size of the previous year's cash-farm income.★★

Classified ADVERTISING

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, P. O. Box 31, Caldwell, N. J. Closing date: 10th of preceding month.

Situations Wanted:

AGRONOMIST: Research and consulting Agronomist with solid background in agricultural chemicals and with special interest in mechanized farming and implements seeks better opportunities to grow. University and industrial experience includes: college teaching; label preparation, correspondence and other administrative tasks; laboratory work; manufacturing supervision; greenhouse and field testing; improvement of application practices; in several countries; government and experiment station contacts, extension and advisory activities, technical service to and promotion of sales. Last two years in charge of product development and control with New Jersey corporation formulating small package line of pesticides and specialty fertilizers primarily water soluble. Age 34; free to travel; speaking German, Italian, French, Spanish; one year study trip through the United States in 1951; broad training; practical farm work and management; European degrees: Cand.rer.nat., Dipl.agr., Dr.agr.; proven ability to improvise under difficult conditions. Write to Box 986, c/o **Agricultural Chemicals**, and you will add to the satisfaction of your customers and you will enable one of your local or foreign divisions to be more successful.

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TECHNICAL SALESMAN: Permanent position with large established Eastern concern. College degree and 2-5 years experience desirable. Knowledge of Agricultural Chemicals field and Pesticide Formulating methods. Substantial salary and liberal company benefits. Please send complete resume of educational and professional history, salary expected, date of availability. Address Box 989, c/o **Agricultural Chemicals.**

CHEMIST: Insecticide research. Knowledge of emulsifiers, solvents, aerosols, and wettable powders. Good background in analytical and synthetic organic chemistry. Familiarity with usual laboratory instruments. Ph.D. or B.S. with heavy experience. Reply full details including salary requirements. Northern New Jersey. Address Box 987, c/o **Agricultural Chemicals.**

For Sale:

FOR SALE: (2) 14,000 gal. Horizontal Glass Lined Tanks; (4) 15,000 gal. vertical welded steel tanks with coils. Can furnish agitators and drives. (12) 3,000 gal. horiz. aluminum tanks. (4) Rotary kilns and dryers. 10'6" x 105', 5' x 30', 4'6" x 40', 3' x 25'. Also Powder Mixers, Hammer Mills, Pulverizers, screw conveyor, bucket elevators, etc. Perry Equipment Corp., 1428 N. 6th St., Phila. 22, Pa.

FERTILIZER MIXING PLANT: Located in best agricultural section of N. C. Showing good profit on $180,000.00 gross and still growing. Would require a minimum of $25,000.00 cash. This is an excellent opportunity for a man to get in business for himself and make good money from the start. Address Box 988, c/o **Agricultural Chemicals.**

FERTILIZER BUSINESS—located in one of the very best irrigated farm communities in entire state of South Dakota. It will pay you to investigate this business. Information and free pictures mailed, no obligation whatsoever on your part. C-5789 Continental, 804 Grand Ave., Kansas City, Missouri.

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Insecticide formulations — knowledge of surface active agents desirable — 3 to 8 years experience. ATLAS POWDER COMPANY, WILMINGTON, DELAWARE. Please direct all replies to Robert L. Herrman, marked personal.

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PINE BEETLE SPRAYS

(*From Page 45*)

Bulletin #81 lists a number of suppliers of pine beetle concentrates including in an incomplete list the following: Ashcraft-Wilkinson Co., Atlanta; Fasco, Jacksonville; Southern Agr. Insecticides, Inc., Hendersonville, N. C.; Tayor Chemical Co., Aberdeen, N. C.; Triangle Chemical Co., Macon; and Chapman Chemical Co., Memphis.★★

ROUND TABLE

(*From Page 55*)

scribed . . . as for additional heat in granulation." He deplored the common tendency to add excess acid to control fumes. He also cited cases in which because of poor maintenance of equipment and excess acid, formulas degenerated to the point where three times as much acid was being used as should normally be required.

Mr. Perrine reported that the TVA continuous ammoniator is a particularly successful unit in ammoniation and granulation operations.

Driers and Coolers

IN the fertilizer industry, the dryer and cooler, which is of the greatest interest because of capacity, simplicity, compactness and low first cost, as well as general economy in operation, is the rotary direct fired cocurrent dryer and the countercurrent rotary cooler.

Because of the heat sensitivity of most fertilizers the temperatures to which they can be subjected, in a dry state, are rather low. This limits the temperature of the drying air, which can be used in a countercurrent dryer, and thereby the heat which a certain amount of air can carry. It follows that for a certain dryer volume, fan size and dust collector size, the capacity of a counter current dryer is much lower than in a cocurrent dryer of comparative size, since in a cocurrent dryer a much higher temperature can be used without damaging the wet fertilizer, entering at the same end as the hot air. While a film of moisture encases each particle, the actual material temperature stays at around 200 degrees, or near the wet bulb temperature, even if the temperature of the air is over 1000 degrees.

There may be certain cases, where plasticity in the wet state makes high temperatures objectionable. Such materials may call for different kind of a heat treatment. However they are then the exception to the rule.

The reasons for a selection of a countercurrent cooler, over a cocurrent one, are basically the same, in that a certain amount of air will absorb more heat when flowing through such a cooler since there is no limitation to how much the material may be cooled. On the other hand, the object is to arrive at the lowest possible material temperature at the discharge end. The only objection to a counter current cooler is dusting at the feed end, but this problem can be solved. Mr. Halldorsson reviewed the effects of "tilting" the drier or cooler, diameter size, material-air contact time, etc. He said that there is a limit to both the diameter and the degree of tilting. Because of road and railway regulations it is difficult to ship larger diameter than 11 to 12 feet. With excessive uphill tilting the material tends to back out of the inlet end or stay too long in the first hot part of the dryer. Both these considerations have been accounted for in the first Fertilizer Dehydro-Mat dryer installed some months ago in Joplin, Iowa.

Mr. Halldorsson, who is the inventor and has obtained a U.S.A. patent on this new type of rotary dryer, licensed to Edw. Renneburg & Sons Co., Baltimore, described the functioning of this dryer, which has created considerable interest in industrial circles and between engineers and received wide publicity.

When discussing dryer capacities Mr. Halldorsson described how formulas in the *Chemical Engineer' Handbook* would come up with a Volumetric Heat Transfer Coefficient of around 4 to 5 in several cases he had checked, where actual experience in the industry would show a figure of 15, or three times as much capacity for both coolers and dryers.

With the first Dehydro-Mat dryer operating in the Fertilizer Industry, coefficients from 25 to 30 and even 35 have been obtained. The coefficient will of course vary for different particle sizes and materials.

In discussing coolers Mr. Halldorsson mentioned that for every percent of moisture evaporated, based on material weight, a temperature drop of approximately 30° could be expected. Finally he described a new type of fertilizer cooler which he has designed, and which is expected to be non-dusting. While it is a counter current unit, it has a co-current inlet end. Patents are in process of being applied for. He also described a possible combination Dryer-Cooler, where the cocurrent principle is adapted to the dryer end, and the counter current principle to the cooler end, ideal for both processes.

The first of these new type coolers is now being built for the Davison Curtis Bay Plant, who are also installing a Dehydro-Mat dryer. Another Dehydro-Mat is starting up in Perry, Iowa. In Texas, three Dehydro-Mats are being started on ammonium nitrate.

When discussing dryer specifications Mr. Halldorsson suggested that it would be practical always to refer to actual dryer capacities in terms of throughput, including recycle, rather than in terms of base material.

EDITOR'S NOTE . . . The third and final part of the report on the Fertilizer Round Table will appear in the January issue of *Agricultural Chemicals*, and contain comments by E. Leister of Edw. Renneburg & Sons Co., on the continuous combination ammoniator granulator; M. W. Thomas, Thos. Alabama Kaolin Co., on properties and use of colloidal kaolin; Wayne King, W. S. Tyler Co., on classifying fertilizers; J. Sharp, Spencer Chemical Co., on further theories of granulation; E. C. Kapusta, U. S. Potash Co., on the role of potash salts in ammoniation and granulation; and A. J. Sackett, of Sackett & Sons, on the nitrophosphate process.★★

Seminar for Bank Farm Reps

Spencer Chemical Co., Kansas City, Mo., held its second seminar for bank farm representatives on November 16th. The first group of representatives of seven states met with Spencer in June of this year.

The purpose of the seminars, advises Spencer, is to seek an exchange of views among practicing farm representatives, and to develop a body of information on farm credit.

•

Sale of Ammo-Gro Div.

Specialty Oil Products, San Francisco, announced recently the sale of its Ammo-Gro Division to a new group incorporated under the name of Ammo-Gro Inc., and headed by F. Chilson of Houston.

Mr. Chilson was formerly president of the Hydrocarbon Construction Corp., and vice-president of the Fish Engineering Corp., both of Houston. He has also been identified with Fluor Corp. of Los Angeles.

•

Heads Neb. Fertilizer Institute

H. L. Peterson, Lincoln Service & Supply Co., Grand Isle, Neb., was elected president of the Nebraska Fertilizer Institute at its first annual meeting late in October. R. E. Bennett, Farm Fertilizers, Inc., was elected vice president; S. Daniels, of General Fertilizers, was elected secretary, and G. Spidel, Spidel Farm Supply was elected treasurer.

•

FMC Advances Emil Ott

Dr. Emil Ott has been appointed director of chemical research and a vice president of Food Machinery & Chemical Corp's chemical divisions. Dr. Ott will be located in the New York offices, pending completion of a multi-million dollar research center for the chemical divisions near Princeton, N. J.

B. & B. Buys Trademark

The trademark "Cal-Nitro" which has been used for some twenty years by Synthetic Nitrogen Products Corp., New York, to designate a nitrogen fertilizer has been purchased by and transferred to Bradley & Baker for use in connection with the sale of their nitrogen fertilizer.

T. Davies, who was with Synthetic Nitrogen Products Corp. as southeastern sales representative will join the sales staff of Bradley & Baker. Mr. Tegtmeyer has been retained by Bradley & Baker as a consultant.

AMERICAN AGRICULTURAL CHEMICAL CO., New York, plans a $125,000 farm fertilizer plant near London, Ont., Canada.

WASHINGTON REPORT

(*From Page* 61)

be no extension beyond that date. The Amendment was signed July 22, 1954. A one-year extension has already been asked for and granted. The end is in sight.

However, farmers and growers have this assurance. By January 22 FDA will have cleared with some kind of a tolerance most agricultural chemicals for seasonal use which are now being officially recommended by the states . . . with possibly a few exceptions. This too can be interpreted as good news, particularly for those who have been worried about whether growers would have ammunition with which to fight the insects the first year the Amendment went into largescale operation.

* * *

Milk is the yardstick being used by the Food and Drug Administration in setting residue tolerances on insecticides for forage crops. In fact the whole range of milk, livestock products and meats is under active scrutiny by Food and Drug. The Agency's position is that there should be no residue of any poisonious deleterious material in milk. Consequently tolerances are being established on the basis that intake of insecticides through forage or feed concentrates must not result in any residue in milk. The first tolerance so established is for heptachlor at the request of the Velsicol Chemical Corp., Chicago. The tolerance is one-tenth of one part per million of heptachlor on alfalfa, clover, and sweet clover, corn, pasture and range grass (vegetables and other crops are also part of this tolerance.)

This is the same position Food and Drug took years ago in connection with DDT. While heptachlor is believed to have a wide margin of safety, the Food and Drug stand is that there should be none of this or any other insecticide in milk, — with no exceptions.

Meat poses somewhat different problems. For instance, certain residues are found in the fatty tissues of meat which are not passed off in the milk. Many discussions are being held on this whole subject. The scheduled establishment of a tolerance on methoxychlor may well set the pattern in this field. The application by the DuPont Company for a tolerance on methoxychlor in meat was to have been acted on 90 days from Sept. 6.

* * *

One question circulating in Washington is whether future control of agricultural production should be by the acre on the bushel. Farmers have demonstrated over and over their ability to increase production per acre, particularly when the number of acres permitted in production under price support programs is limited.

Control by the bushel, however, poses other questions resulting from that great unknown factor in agricultural production, variation in yield resulting from the weather. Some plans under active consideration would take from one acre in fourteen to one acre in twenty out of crop production, and make the farmer eligible to receive a "land bank payment" of five to seven percent of the value of the acre per year.

It seems certain that some plan will be developed by both political parties to offset declining farm income. Producers of pesticides and fertilizers, of course hope that any plan adopted will recognize that increased production efficiency is desirable and should be encouraged. Any program which acts to control production by penalizing efficiency is bound to fail.

* * *

Just back from Los Angeles where I attended the 39th Annual Meeting of the National Milk Producers Federation, an organization representing leading dairy farmers from coast to coast. This organization adopted a proposal termed "The Self-Help Plan." Under this program dairymen would handle their own production and surplus problems, thereby relieving the taxpayer of supporting the price of milk and dairy products.

The self-help plan means year-round stabilized prices without depending on the government and without marketing quotas. Second, it would provide protection from surpluses resulting from imports or government programs of acreage adjustment. Third, accompanying research programs would develop new and expanded markets for dairy products. Fourth, it would furnish a convincing demonstration to everyone that the dairy farmers are willing to run their own program free from government dependence. Fifth, with the operation of the program in the hands of leaders elected by dairymen themselves, there is the assurance of expert and efficient management.★★

N. J. DEALERS

(*From Page* 37)

Orthol D rated fairly high for mildew control in green house tests. A combination of Actidione 1 ppm, Captan, and Marlate gave good mildew control, but the mixture is considered too expensive for commercial use.

Ferric sulfate and NuIron (a product of Tennessee Corp.) were used effectively in reducing dry stem injury of sour cherries. Dry stem is a form of arsenical injury augmented by hot dry weather. The iron compounds apparently behave as arsenical corrections.

Dr. J. C. Dunnegan, principal pathologist of the USDA, Beltsville, Md., spoke as a guest speaker on his observations of the control of banana leaf spot disease in Guadeloupe in the West Indies. Dr. Dunnegan showed color slides of portable mist concentrate equipment used by growers.

Dr. Palm mentioned at the banquet a report sent to him by Dr. J. G. Matthysse of the first meeting held at the College of Agriculture, University of the Philippines, of representatives of industry and college faculty interested in the pest control field. Members of the Cornell faculty presently located at Los Banos participated with their Philippine colleagues.★

Index to ADVERTISERS

Tale Ends

MANY of our alert readers were quick to catch AC's editors last month in one of those illustration mix-ups that cause anguish and gray hair in the publishing business. In our report on the annual Washington meeting of the fertilizer control officials, (Pg. 52) and right in the most prominent spot on the page, we ran what was supposed to be a group photo of fertilizer control officials taken at the banquet given for them by Natl. Plant Food Institute. Due to a slip-up at the print shop it turned out to be ten other characters who wouldn't know fertilizer from frappeed plum juice. The fertilizer officials themselves were very nice and understanding about the whole thing. Just to set the record straight, we run the correct picture above. The group are (front row, l. to r.) J. J. Taylor, Florida, Stacy B. Randle, New Jersey, R. W. Ludwick, New Mexico, past president, and M. P. Etheredge, Mississippi, newly elected president of the organization, and (rear row l. to r.) F. W. Quackenbush, Indiana, C. V. Marshall, Canada, J. D. Patterson, Oregon, and Bruce D. Cloaninger, S. Carolina, secretary-treasurer.

AC

Farm Journal in a recent issue tells the story of a Texas wheat grower who, because of a wrongly set valve, put 126 pounds of anhydrous ammonia per acre on his crop instead of 50 as planned. But the mistake was a fortunate one, and "he chuckled all the way to the bank," for the heavily fertilized acreage averaged 64 bushels to the acre. The big dose of anhydrous cost $12.60 an acre, but made an extra $92.25 worth of wheat.

AC

An ambitious spray project, which it is hoped will succeed in wiping out malaria in the western hemisphere, was scheduled to get under way in Mexico late last month. About two million dollars per year will be spent over a five year period in a program of saturation spraying in an attempt to achieve complete eradication of malaria. With several American agencies participating, U. S. Funds will go primarily for technical assistance, — the outlay for actual insecticides and equipment to come from the individual countries where spraying will be done. Materials to be employed include DDT and dieldrin.

AC

Have we worked ourselves all the way round the circle in insect and disease control chemicals? With Louisiana going back twenty years to calcium arsenate for boll weevil control, and New York State talking of sulphur in place of the modern fungicides, the faces of some of our pesticide research workers could understandably be a bit red.

AC

And right at the time when newer and more effective pesticides are needed, our research teams are so busy supplying data to support tolerance applications that we wonder how they have any time left over for development or testing of new materials.

DIAZINON*

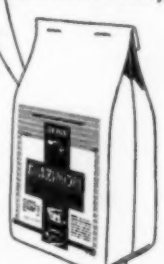
FORMULATIONS

There is no need for us to tell you how important fly control is in your dairy barns and that effective fly control makes for contentment of the herd, increased milk production and greater profits.

However, we do feel that we should bring to your attention the fact that DIAZINON, the amazing new fly killer you've been hearing so much about is now recommended for control of flies in dairy barns. Exhaustive tests have shown that residual applications in dairy barns do not result in milk contamination.

Another outstanding product of Geigy's long range research program, DIAZINON has both quick knock-down action and long residual properties. Reports of the superior effectiveness of DIAZINON have been received from research workers in thirty-nine states, where it has proven to be the most effective residual fly control chemical since the introduction of DDT insecticides by Geigy.

Because of DIAZINON'S long residual action, two or three sprays will usually control flies in dairy barns for an entire season. Only 4 lbs. of the 25% wettable powder in 25 gals. of water is required to treat an average size dairy barn.



A DIAZINON program, in conjunction with good sanitation measures, now offers safe, effective and economical fly control for the dairy barn and other farm buildings.

Ask your local farm supply dealer about DIAZINON . . . available in wettable powder, emulsifiable and granular bait formulations.

ORIGINATORS OF Geigy DDT INSECTICIDES

GEIGY AGRICULTURAL CHEMICALS *Division of Geigy Chemical Corporation* **89 BARCLAY STREET, N. Y. 8, N. Y.**

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PUT THESE EXTRA SALESMEN TO WORK FOR YOU

Included in the large amount of promotional and educational material prepared by Hercules are many items that can help you sell more insecticides. If you haven't already done so, why not add these aids to your selling force?

Insect identification folders make ideal inserts for dealer mailings; wall charts, decals, and streamers do an on-the-spot selling job in dealers' stores; specially treated weather-resistant materials are available for outdoor displays; newspaper mats, radio scripts and TV films dovetail with your own advertising campaign.

If you are not now making full use of this free material, your toxaphene representative can give you complete information.

TOXAPHENE dusts · sprays

Agricultural Chemicals Division, Naval Stores Department

HERCULES POWDER COMPANY

970 Market Street, Wilmington 99, Delaware

Plants at Brunswick, Ga.; Hattiesburg, Miss. Offices at Atlanta, Ga.; Birmingham, Ala.; Brownsville, Texas; Boston, Mass.; Chicago, Ill.; Dallas, Texas; Denver, Colo.; Detroit, Mich.; Los Angeles, Cal.; New York, N. Y.; Raleigh, N. C.; St. Louis, Mo.; San Francisco, Cal.; Toronto, Canada

THE CHEMICAL BASE FOR TOXAPHENE IS PRODUCED BY HERCULES FROM THE SOUTHERN PINE

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